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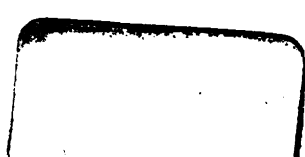
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State of New York.

State Hospitals Bulletin

A QUARTERLY REPORT OF CLINICAL AND PATHOLOGICAL WORK
IN THE STATE HOSPITALS (FOR THE INSANE), AND
THEIR PATHOLOGICAL INSTITUTE.

[Published by authority of the State Commission in Lunacy.]

VOL. I.

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The PRESIDENT OF THE STATE COMMISSION IN LUNACY,
The SUPERINTENDENTS OF THE STATE HOSPITALS,
And the DIRECTOR OF THE PATHOLOGICAL INSTITUTE.

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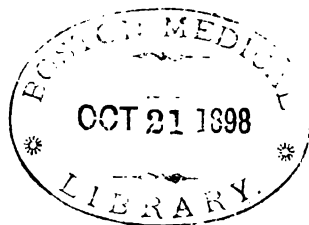


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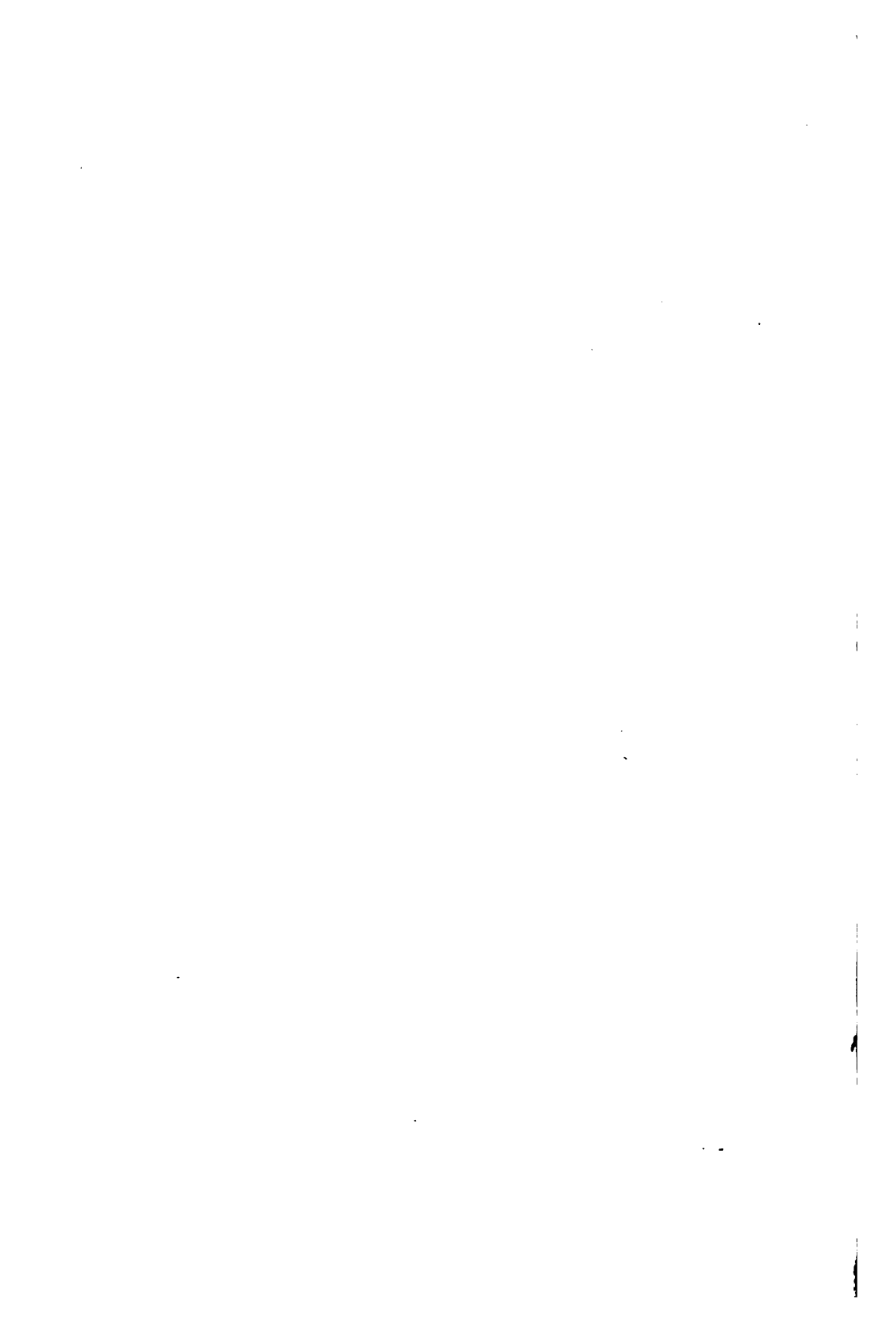
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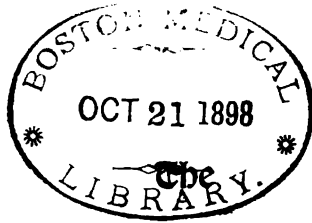
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State Hospitals Bulletin.

January, 1896. PUBLISHED QUARTERLY. Vol. I, No. I.

ANNOUNCEMENT.

The ten State Hospitals of New York State are caring for and treating 12,174 insane patients. With the transfer of the New York City Asylums to the State system, this number will be increased to 19,369. There are 2,721 persons employed to care for the insane and for the administration of the present ten hospitals. There are 91 physicians directly engaged in the medical service of these hospitals, exclusive of those engaged in the pathological department, and of the consulting physicians and surgeons of the several hospitals.

* * *

The above data will give a sufficient reason for a new publication. That a need exists for a means to disseminate the clinical and pathological data, which must inevitably accrue from such an extensive medical service, requires no argument. The statistics are sufficient evidence. Efforts have heretofore been made to present some of the material resulting from the hospital practice, in the form of medical addenda to the annual reports of the hospitals. But the objection to this practice is, that these reports were contemplated to give to the Legislature the business operations of the hospitals, and that, consequently, but a small proportion of the distributed copies reached the

medical profession, where only the medical report could be properly appreciated.

* * *

The BULLETIN may be said to be an outgrowth of these medical reports. It is intended to harmonize the medical work of the hospitals. They are put upon a substantially uniform basis, and individuality is lost, for in all general work, such as the investigation of new subjects, they will each participate in a like degree. In voluntary contributions, however, a certain degree of individuality of hospitals will be preserved, sufficient, the committee hopes, to stimulate the medical service to close and accurate observation.

* * *

The BULLETIN is not intended to compete with any journalistic work in present existence. It is, in short, prohibited from journalistic work, and confined to reports of clinical and pathological data in the several departments of the State Hospital service. In this way it is believed it will act as coadjutor to journal workers, in presenting facts that may be used by them. The ordinary statistics of hospital work will be analyzed and presented during the course of the year, in a form that may be understood. The ordinary presentation of insane hospital statistics receives no attention, for the reason that they are not comprehended. A function of the BULLETIN will be to make them useful by analysis.

* * *

The scope of the BULLETIN will be confined, therefore, to an expression of hospital experience and practices, and deductions based thereon, and to pathological findings. It is the purpose to preserve and disseminate in this manner useful and interesting facts that would otherwise slumber

undisturbed in case-books and clinical records. It may be considered in the light of a "psychiatrist at the breakfast table" and as it is not intended to compete with the formal journals, so it should not be compared with them in the character of its contents. What might be lost by a belief in its lack of importance for a journal article will find a place in the BULLETIN. Negative results will be recorded. Results in therapeutics and physical treatment will be freely used.

* * *

The organization of the pathological work in the State of New York will be ideal, and the BULLETIN will be the organ of this department. A central bureau will be known as the Pathological Institute and will be under the control of the Director. The hospital laboratories will be under the supervision of the Director, and members from each hospital staff will be assigned to him as assistants. All the hospitals will thus participate in the laboratory work, and the several local laboratories will have their work assigned by the Director, thus preventing unnecessary duplication of labor, and all working intelligently to a common purpose. The advantage of this method needs no emphasis. It can readily be understood. The BULLETIN will publish regularly the progress in this department, without waiting for positive results. This department will be perfected during the coming year.

* * *

There are many special cases outside the usual forms of classification, that will be reported in the BULLETIN. It is not the purpose to teach something new in each report, but to add to the aggregate of cases that should receive further attention and study, and thus to save for available use what might otherwise be lost in case records.

Until further notice the BULLETIN will be published quarterly. The Committee hopes that the first year's experience may require a shorter interval, but predictions will not be indulged in at the present time. If a progressive spirit animates the medical service in our State Hospitals, the BULLETIN will live, and we believe it will be an abiding evidence of such a spirit for many years to come. All departments of the State Hospital service are united in a hope for its success, and an effort equal to the desire will assure it. The State Commission in Lunacy has given it the material aid required, and has added to this requisite support by encouragement and counsel.

* * *

The BULLETIN is a public document only in the sense that it is published by the State. It is expected that the support it will receive from subscriptions will relieve the State from any considerable expense. The subscription is purposely placed very low in order to secure a wide distribution. No advertisements will be received or published in the BULLETIN.

* * *

The committee infers from instructions it has received from the board of editors that no further expression will be required from it, unless there should be a change in the policy or the plan of the BULLETIN. Its pages will hereafter be occupied by reports; and it will not review or epitomize from other journals. Its purpose will be to give a résumé of the clinical and pathological work in the State Hospitals.

THE EDITORIAL COMMITTEE

January 1, 1896.

A FEW CASES OF CEREBRAL TUMOR.

REPORTED BY J. NELSON TEETER, M. D.,
Assistant Physician, Utica State Hospital.

Gross lesions of the brain bear a small part, if any, in the causation of insanity, but there is an important question which may be considered in relation to this subject—the differential diagnosis between certain forms of tumor and certain forms of mental alienation of the type of pure insanities. The question becomes a problem of whose solution we often despair, when apparently in the course of a case of undoubted insanity a cerebral tumor or other gross disease develops. The aggravation of symptoms produced by this disease may be attributed to the course of the patient's known disease, and unless the observations made are very efficient and scrutinizing the full nature of the trouble may be overlooked.

The differential diagnosis between the gross lesion pure and simple and insanity presents but little difficulty, the irregularity of symptoms in the former clearly distinguishing it from the method of symptoms in the latter. A tumor of the frontal lobe will give the most difficulty, but in such a case we notice first, the gradual onset of persistent severe headache of a paroxysmal nature which drives the patient constantly to the physician for a relief obtainable only through large doses of anodyne. The cephalalgia occurring in insanity is not so severe and is apt to be intermittent. Frequently on closely questioning a patient, it will be found that he ascribes his pain to persecutions of his enemies or to the influence of electricity or poisons. Percussion of the head in cases of brain tumor will usually elicit an increase of pain in the region affected, but in the headache occurring in insanity no localization is discernible, and exaggeration of pain is produced by indiscriminate percussion.

Delirium, perhaps with delusions, hallucinations and illusions, coming on in cerebral tumor, may simulate the

symptoms presented by a case of insanity.* In such a case, a previous history of marked headache, the presence of a tumor elsewhere in the body, a history of tuberculosis or syphilis, and an examination of the eyes for optic neuritis, after kidney disease or anæmia has been excluded, will establish the diagnosis. The following is a case of brain tumor, illustrating this feature:

The patient, a man, 34 years of age, a laborer, was admitted to the hospital with symptoms simulating an attack of acute delirious mania, with no signs of any general disease, such as pneumonia or any of the infectious fevers. A history of illness extending over several months excluded acute meningitis. He was confined to bed and was continually excited and required restraint. The following day he lapsed into a condition of coma. His eyes had been examined with the ophthalmoscope and optic neuritis found. Bright's disease was excluded by repeated examinations of the urine. Upon a more detailed observation of patient, a slight evidence of paralysis was found in the left leg—when the extremity was raised it would drop more quickly and apparently was not controlled as easily as the corresponding extremity of the other side. On the third day he was visited by his physician from whom a history of syphilis was obtained. A diagnosis of gumma of the brain was made, and in three months, under large doses of potassium iodide and bichloride of mercury, he entirely recovered. This was undoubtedly a case of tumor of the frontal lobe on the right side exerting pressure upon the parietal lobe.

If in a case of insanity the patient develops a violent paroxysmal headache, without irritative or paralytic signs, a tumor of the frontal lobe may be suspected. An examination of the eyes for optic neuritis should at once be made. The lungs should be examined for tuberculosis, the body searched for growths of any kind, and a careful search into the patient's previous history be made for any syphilitic taint. As iodide of potassium holds out the only hope in cases of this kind, he should be put upon such treatment at once.

Following this brief introduction, I wish to present in detail two cases of brain tumor, the first affecting the parietal lobe on the left side in a man not insane; the second

* A case is reported by Gowers where marked hallucinations of sight were present. See *Text-Book of Nervous Diseases*, vol. II, page 507.

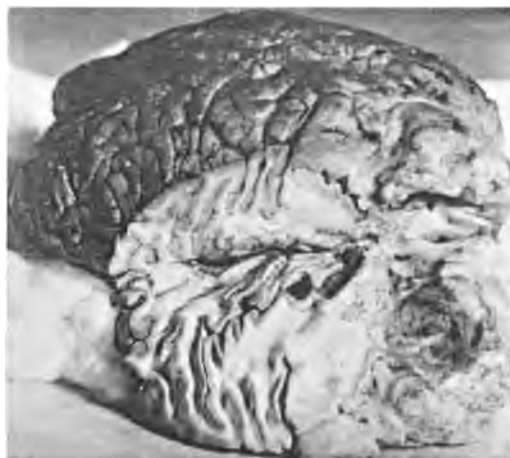
affecting the frontal lobe on the right side in a case of insanity.

CASE I.—Man, aged 39, by occupation accountant. Family history good, except in the case of a brother who died at the age of 39 of sarcoma. Patient used tobacco to excess, but did not indulge in alcohol. He never had venereal trouble, and did not suffer from tuberculosis or kidney disease. For eighteen months before the beginning of his illness he had been working very hard, doing a great deal of night work. His illness commenced on June 1st, 1895, the first thing noticed being severe pain and loss of motion in right thumb, index and middle fingers. It is perhaps interesting to note that patient had no headache at this time and did not have for several months afterward. The paralysis gradually extended, involving the entire arm, including the deltoid muscle. Occasionally there were spasmodic contractions of the paralysed muscles. Six weeks after the first symptom was noticed trouble in walking commenced. Extending paralysis of the right leg and thigh gradually developed and ten weeks after the inception of his trouble complete hemiplegia of the right side resulted. There was no affection of sensation. The knee jerk on the affected side at first was exaggerated, but later lost. At this time it was noticed that he yawned frequently, and the unusual fact appeared that while yawning his forearm would become flexed upon his arm on the paralysed side. When the hemiplegia was complete, symptoms of aphasia came on, showing an extension of the process to the speech centre. Headache did not come on until the beginning of August, and it was not then the pain characteristic of cerebral tumor. The pupil on the left side reacted sluggishly to light. Ophthalmoscopic examination made by Dr. Glass, of Utica, showed the presence of optic neuritis. The cranial nerves were not affected. He had no convulsions and no vomiting. His mental state remained normal until about two weeks before death. He was not stuporous or irritable. During the last two weeks of life, however, four attacks of coma occurred. From the first three he became conscious after intervals of from twenty-four to forty-eight hours, but the fourth attack lasted three days and ended in death. I am indebted to Dr. William M. Gibson, of Utica, for the above history.

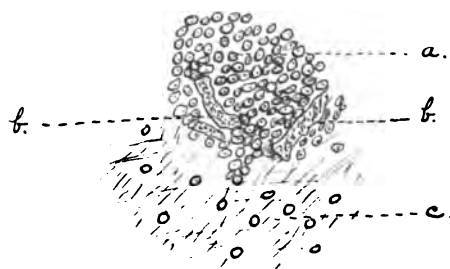
At the request of friends, the post mortem examination was confined to the head. When the skull-cap was removed, there was bulging of the brain on the left side in the parietal region over an area of about 6 centimetres antero-posteriorly and $5\frac{1}{2}$ centimetres transversely, the anterior and posterior central convolutions and the posterior portion of the third frontal being particularly and noticeably involved by the growth. Only the affected portion was removed. Upon cutting away the tumor, a cyst was disclosed containing about two ounces of a yellowish, semi-gelatinous fluid. The cyst was pyramidal in shape, the apex pointing toward the lateral ventricle but

not opening into it, the base being directed outward and corresponding with the softened tissue. The microscopical examination of the fluid contained in the cyst presented red blood corpuscles, round cells, broken down brain cells and an occasional giant cell, showing the probability of a recent hemorrhage into the substance of the tumor. The tumor itself, which was examined in the laboratory of the Utica State Hospital, appeared rounded, was very soft and easily broken up. The pia mater was not involved. Microscopically it was found to be made up entirely of round cells, presenting the appearance of sarcoma. Large blood-vessels with very thin walls were scattered through the new structure, and giant cells with numerous nuclei were present.

CASE II.—Man, aged 47, by occupation machinist, of German descent, was admitted to the Utica State Hospital, February 4, 1893. Previous history of the patient was negative, both as regards his family and himself. During his stay at the hospital he was usually quiet but had occasional periods of excitement. He was controlled by delusions of a persecutory nature, referring particularly to the imaginary influence of electricity. He also believed that his wife was a "bad woman." As time went on, he grew quieter and more feeble-minded and expressed his delusions less freely. About June 1st, 1895, he first complained of headache, which he located in the frontal region. Nothing serious was thought of this symptom at first, but after some weeks it was observed that the cephalalgia had not diminished, but had become more severe, and upon percussing the head the pain was increased when the frontal region was approached. When asked for the cause of his headache, patient claimed that it was due to the electricity that was put into him by the doctors and others about him. At this time considerable doubt was felt as to the exact nature of the trouble, but the supposition that patient's headache was due to gross brain disease, and that a syphilitic history may have existed, was assumed and he was put upon appropriate treatment. No tuberculosis or kidney disease was present. A note was made in the case-book September 15, 1895, stating that patient was growing greatly confused and stupid. He complained still of severe headache which was not affected by anodynes. On October 1st he was confined to bed. He was now stupid and at times partially comatose, and during his brightest periods the only matter he would refer to was headache. On October 7, 1895, he became greatly exhausted and suddenly lapsed into a state of profound coma in which he remained for about eight hours, when death occurred. At no time in this case was any motor or sensory affection present. There was no affection of the cranial nerves. Speech remained perfect until the final coma set in. The only noticeable symptoms were the presence of severe headache and the rapidly increasing mental deterioration. The eyes were not examined ophthalmoscopically, but were observed as to light and accommodation, when



Longitudinal section of tumor. Case II.



- a. Round cells.
- b. Newly formed vessel
- c. Unaffected brain.

Microscopical appearance of tumor. Case I.



Tumor *in situ*. Case II.

no change was noticed. There was no vomiting, and no convulsions occurred. The anti-syphilitic treatment had been kept up continuously until a few weeks before death.

At the autopsy there was found a slight effusion of blood, extradural, over the right hemisphere, but not enough to produce symptoms. Upon removal of the dura, the right frontal lobe was found extensively compromised by a large tumor which on the surface measured $7\frac{1}{2}$ centimetres transversely and $8\frac{1}{4}$ centimetres antero-posteriorly. It extended downward toward the base of the frontal lobe but did not include the whole lobe in this direction. The superior and middle frontal convolutions, partly involved by the growth were pushed backward and encroached upon the parietal region. The marginal convolution was pushed in the direction of the left hemisphere, indenting the marginal convolution of that side. The ventricles were dilated. The weight of the brain was 56 ounces. Further examination of the body revealed nothing bearing on the case.

The tumor found in this case was rounded, of a whitish appearance, not easily detached from surrounding brain tissue, in places of firm consistence, in others considerably softened, and enclosed in its substance was a cyst containing one ounce of straw-colored fluid, which showed nothing of interest microscopically. A few bands of firm tissue extended from wall to wall of the cyst. Microscopically, the tumor was found to be made up completely of neuroglia cells with here and there areas of degeneration which were yellow in color (not being affected by the staining reagent) and containing a few scattered cells. The neuroglia cells were greatly crowded and their processes much shortened and obscured. A photograph of this tumor *in situ* and upon longitudinal section is here shown.

In connection with these two cases, I might speak also of another case of probable tumor seen at Bellevue Hospital. The patient, a woman, aged 38, was admitted in October, 1893, with a history of vertical headache extending over a period of two years. Her previous history was negative. About one year before coming to the hospital, she had had trouble with her eyes, particularly the right. Upon examination, it was found that the headache was located in the frontal region and was much increased upon tapping this area; that patient was confused and irritable and did not sleep well. Repeated examinations showed no loss of motion or sensation and no affection of the cranial nerves. There was no evidence of Bright's disease. The ophthalmoscopic examination was made by Dr. Weeks of New

York, who was connected with the hospital, with this result: In the left iris there was evidence of an old iritis, with traces of adhesion of the iris to the lens; in the right eye, evidence of a specific neuro-retinitis were present; this existed also in the left eye but was not marked. The patient was given anti-syphilitic treatment and eventually recovered. It is impossible in this case to state definitely whether the pathological lesion was a tumor or a gummatous meningitis, but it shows the importance of giving iodide of potassium and mercury a fair trial in all cases of long standing localized headache combined with mental decay, and not attributing such symptoms to hysteria or to incipient insanity.

These cases are presented to call attention to the fact that in cases of insanity with severe persistent headache a close observation of the patient should be made, in view of the fact that gross disease may be its cause, for, in cases where a syphilitic history can be obtained, or where the disease is amenable to operation, there is an opportunity to adopt some rational method of treatment.

ANALYSIS OF ONE HUNDRED AND FIFTY-SIX ADMISSIONS TO THE ST. LAWRENCE STATE HOSPITAL, WITH ESPECIAL REFERENCE TO ACUTE INSANITY.

By J. M. MOSHER, M. D.,*

First Assistant Physician, St. Lawrence State Hospital, Ogdensburg, N. Y.

The great population of chronic cases in a large public hospital for the insane misleads the superficial observer as to its possible curative functions, and overshadows the results of treatment prevailing in the few wards organized and disciplined for the application of remedial measures to patients who present prospect of recovery. The custom of including in the same figures an overwhelming number of chronic with a few acute cases and the adoption of tables

* Resigned November 1, 1895.

of classification which ignore the vital distinction between these two classes vitiate statistics and result in injustice to the institution, and misapprehension as to the merits and successes of its administration.

To overcome in some measure this difficulty the present contribution treats the admissions to the women's department of the St. Lawrence State Hospital during the last fiscal year apart from the permanent population, and seeks to establish some basis upon which to justify the methods for the relief of patients whose history and condition when received in the hospital lead to the hope of cure.

In order to differentiate plainly functional from organic conditions, the following supplemental table of classification has been adopted, in which this distinction is made the prominent feature:

CLASSIFICATION OF INSANITY.

a. PSYCHOSES:

1. Mental disorders with pronounced physical debility.
 - a. Acute delirium.
 - b. Acute stupor.
2. Mental disorders without pronounced physical debility. (Confusional insanity).
 - a. Acute melancholia.
 - b. Acute mania.
 - c. Sub-acute melancholia.
 - d. Sub-acute mania.

b. PSYCHIC DEGENERATIONS:

1. Mental degenerations of diathetic origin.
 - a. Primary delusional insanity.
 - b. Periodic and circular insanity.
 - c. Recurrent insanity.
2. Mental degenerations with organic disease of the brain.
 - a. General paralysis.
 - b. Chronic endarteritis without senility.
 - c. Senile insanity.
 - d. Epileptic insanity.
 - e. Terminal dementia.

During the fiscal year from October 1, 1894, to September 30, 1895, inclusive, there were 156 admissions of women. Of these, one patient was a victim of the opium habit and was classified as not insane, seven patients were classified as idiots or imbeciles, and two patients were admitted twice during the year. Of the 146 cases remaining, 59 were classified among the psychoses, or curable forms, and 87 among the degenerations, or incurable forms.

In the second class, that of the degenerative forms, have been included the chronic delusional manias and melancholias, the periodic forms and the insanities depending upon organic disease. The term recurrent insanity has been used to indicate cases characterized by three or more attacks of insanity in which the fact of periodicity is in doubt. Recoveries from the recurrent attacks have not been regarded in the table of results. In the class of mental disorders depending upon organic disease, it has been found necessary to give due consideration to the various forms of chronic inflammation or degeneration of the blood vessels. Chronic endarteritis, or arterio-capillary fibrosis, may be regarded as one of the degenerations of old age, but it has also been found as a distinct disease at a period of life in which senility could not be claimed. Several patients of this class under sixty years of age have presented various mental manifestations, usually with indications of dementia and also with few or many of the physical deteriorations, usually accepted as the natural conditions of old age. In a few instances these patients have so far improved as to be discharged from the hospital; in other cases chronicity has been positively established; and in others death has resulted from apoplexies, or apoplectic form or uræmic conditions. In the early differentiation of these cases, attention has been given on the physical side to organic lesions of the heart, to prominence and tortuosity of the radial pulse, prominent blood vessels at exposed surfaces, wrinkled and attenuated cutaneous structures, arcus senilis and changes in the bones. Although improvement has occasionally resulted to such degree that it has been possible to discharge the patient from the

hospital, its temporary nature has been considered and the cases have not been included in the table of results.

Within the limits of the present contribution consideration of the curable cases only is feasible. Of the 59 cases so classified, 37 have attained such period of development as to render the result of the disease certain; 22 patients still under treatment are regarded as in the acute or developing stage of the disease, in whom during the presence of the element of probability, it has been thought best not to anticipate the result. Of the 37 determined cases, 25 have recovered, 6 have died, 2 have, in all probability, become chronic, and 4 have been discharged improved. The percentage of actual recoveries is thus 67%, and of deaths upon the whole number of recoverable cases admitted has been slightly over 10%, upon the whole number of admissions has been 3+%.

ACUTE DELIRIUM—NINE CASES.

The term acute delirium has been applied to cases hitherto generally described as acute delirious mania, sometimes acute delirious melancholia, but recently in several instances acute delirium. The great motor or mental excitement, whose emotional manifestations may be either depressing or exhilarating, is not considered to justify a distinction between the terms mania and melancholia in the presence of the great physical prostration of which the delirium appears as a symptom. The differentiation of this form of mental disorder has been variously made upon (1) a pathological basis;* (2) a symptomalogical basis;† (3) a diathesis;‡ (4) the generally fatal result.§

Dr. H. C. Wood (*loc. cit.*) draws attention to the various forms of disease comprehended by different writers under the term of acute delirium, and seeks to differentiate cases involving organic cerebral disease from those whose re-

* H. C. Wood: "An Expiscation of Acute Delirium."—*American Journal of the Medical Sciences*, April, 1895.

† Régis: *Practical Manual of Mental Medicine*, page 165.

‡ Bevan-Lewis: *Text-Book of Mental Diseases*, page 172.

§ Savage: *Insanity and Allied Neuroses*, page 93; Maudsley: *Pathology of Mind*, page 272; Bevan-Lewis, *loc. cit.*, page 172.

covery demonstrates their functional character. He deplores the necessity of invoking the result to the aid of the diagnosis, but finds no symptoms for their differentiation and shows especially the failure of a characteristic temperature curve, to which Régis (*loc. cit.*) attaches great importance. Between the recoverable cases defined as the "culmination of active nervous exhaustion with a psychological explosion,"* and the fatal cases resulting from acute periencephalitis, there were found no distinguishing signs.

In the nine cases observed during the past year at the St. Lawrence Hospital there have been many points of similarity. The disease began suddenly in patients whose previous condition gave no intimation to the ordinary observer of departure from health. In the eight cases of which definite information was received, the longest duration preceding admission was two weeks and the shortest was two days. There was extreme and rapidly increasing physical prostration, generally attaining the typical typhoid state. The pulse was accelerated and weak, the tongue and mouth were parched and dirty, the bowels constipated, the abdomen collapsed and without resilience, and the skin dry and hard. The temperature attained only moderate degree, and in no case was there marked pyrexia or hyperpyrexia unless from complication. Active hallucinations of the senses with entire incoherence and great restlessness were prominent in all cases, frequently showed periodicity, with intervals of calm of shorter or longer duration, during which there occasionally appeared an entire remission with approximation to a normal mental state. The short duration of the active stage and the speedy convalescence of the recoverable cases were features of the disease. To contrast with these cases the hospital can refer to the record of only one case of acute periencephalitis.† In this case the temperature was not elevated above that of the cases of acute delirium now under consideration and the only symptomalogical difference was the report of a longer

* Dr. John B. Chapin, quoted by Dr. Wood, *loc. cit.*

† St. Lawrence State Hospital, Eighth Annual Report, page 119.

duration of the disease before admission (one month), a fact of uncertain and indefinite value.

The principles of treatment of these cases were seclusion, rest, abundance of nutritious food, and stimulants and tonics. Contrary to the methods of treatment usually advocated, hypnotics were not used.*

The patients were placed in bed in a retired and moderately darkened room. Nurses were detailed for day and night service and instructions were given at the outset for the administration of liquid diet, preferably milk, whenever the patient could be induced to accept it. Advantage was taken of the quiet intervals and coercive measures were entirely prohibited, or in some instances reduced to a minimum. In one case only was forcible feeding with the nasal tube attempted, and the result was not thought to have justified this proceeding. The administration of laxatives was an initial procedure, enteroclysis was occasionally found of value, and stimulants and tonics were given at the earliest possible opportunity. Under favorable conditions prolonged warm baths were found to promote sleep. Convalescence was managed by properly regulated exercise and the occasional administration of electricity and massage.

CASE No. 1937—Acute delirium with complicating pulmonary emphysema. Woman; aged 53; widowed; nativity, Canada; occupation, housewife, midwife; cause, overwork.

Family history: two sisters insane; one son has asthma. Personal history: patient has been strong except for asthma. Two and one-half years before admission she had pneumonia, and her health since that time has not been good. During a period directly preceding admission to the hospital, patient attended as nurse three cases of confinement in succession and in each case, besides caring for baby and mother, attended to the household duties, often working at the wash-tub until late at night. The present attack began suddenly while she was thus employed a few days before admission.

* Régis, (*loc. cit.*): "The use of the usual sedatives and hypnotics."

Blandford: *Insanity and its Treatment*, page 251: "By chloral or the combination of it with bromide of potassium, sleep may be procured in the majority of cases, and, in my experience, deaths from exhaustion have been greatly diminished."

Bucknill and Tuke: *Manual of Psychological Medicine*, 4th ed., page 736: "Beware of Hypnotics."

TABLE No. 1.—ACUTE DELIRIUM.

Case No.	Rec.	Imp.	Death.	In Hospital Prospect.	Before Admission.	Under Treatment.	Gain in Weight.	Remarks.
1937	Yes.	....	....	.....	4 Days.	5½ cc ka.	13 lbs.	Pulmonary emphysema.
1900	Yes.	....	....	.....	2 Days.	3 Months.	13 "	Recovery following acid.
1900	Yes.	....	....	.....	2 Weeks.	10 Weeks.	13 "	Excessive drugging.
1856	Yes.	....	....	.....	1 Week.	7 Months.	13 "	Relapse following epidemic influenza.
2212	Yes.	....	....	.....	1 Week.	3 Months.	5 lbs.	Rapid improvement.
2168	....	....	....	Poor.	2 Weeks.	4 Months.	.....	Very bad heredity.
1886	....	....	....	Not Good.	2 Weeks.	9 Months.	.....	Chronic nephritis—hemiplegia.
2230	....	....	....	Good.	10 Days.	3 Weeks.	.....	Admitted Sept. 11. Convalescent.
2254	....	....	....	Good.	Indefinite.	6 Weeks.	.....	Admitted Aug. 16.

Cases, 9. Completed cases, 7. Recoveries, 5. Deaths, 0.

Percentage of recoveries to completed cases, 71½.

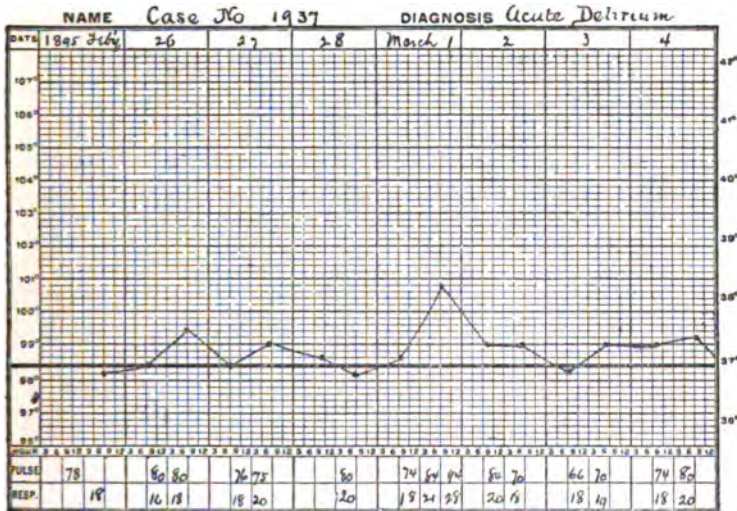
Average duration before admission (8 cases), 9 days.

Average period under treatment of 5 recovered cases, 14 weeks.

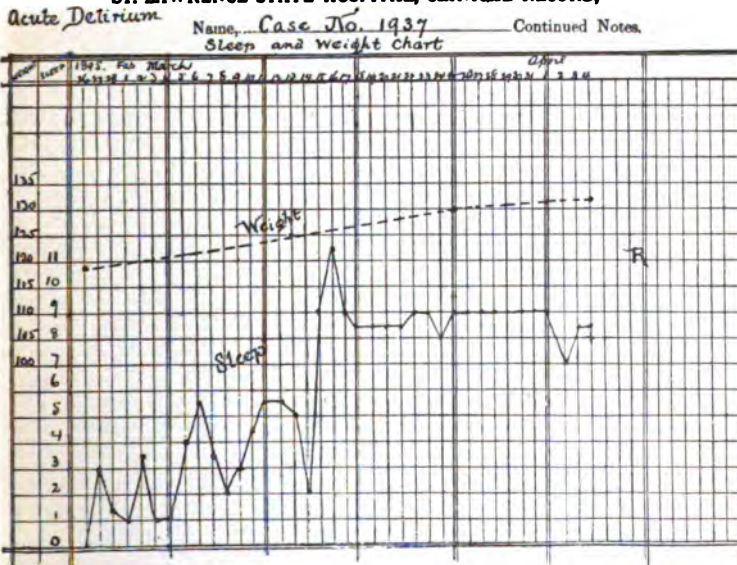
Average gain in weight of 4 recovered cases, 11 lbs.

The features of the case were persistent refusal of food and medicine, and complicating asthma. Patient was admitted to the hospital February 25, 1895, and accepted only a small amount of nourishment from that time until the evening of March 3d, when she began to drink

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milk. In the succeeding week the excitement subsided, and with an intervening period of loquacity without delusions, she passed from delirium to a rational and intelligent mental condition. Convalescence was rapid and she was discharged recovered April 4, 1895.

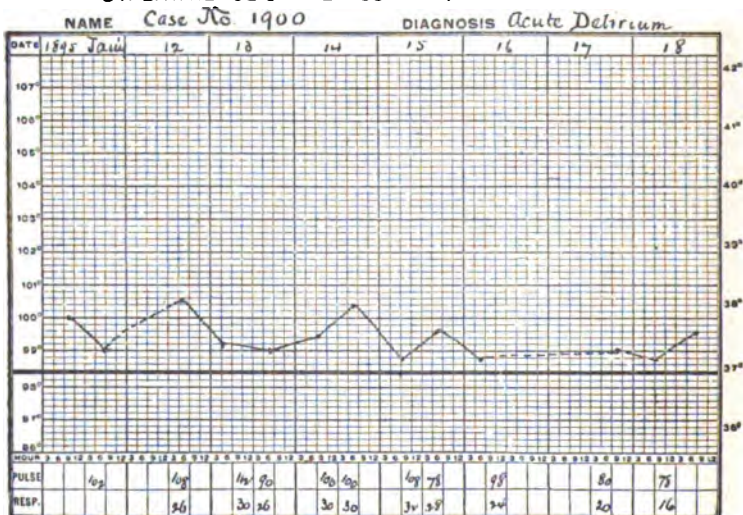
CASE No. 1900.—Acute delirium, with accidental scald during plunge bath, followed by marked reaction and improvement and resulting in recovery.

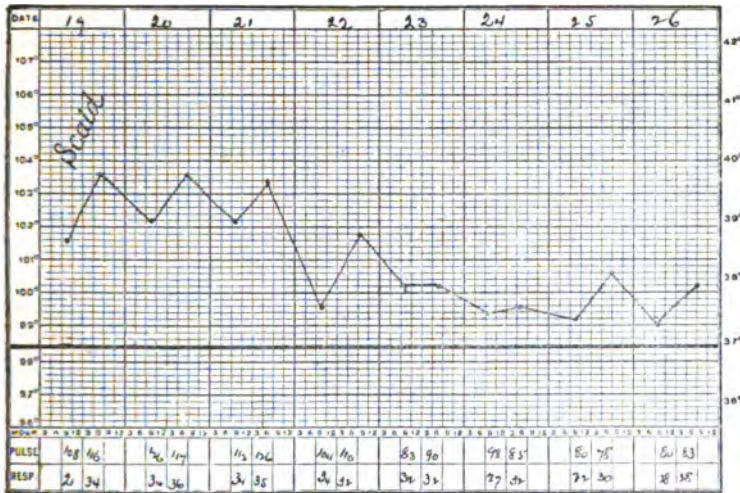
Woman; aged 51; widowed; nativity, New York; occupation, housewife; causes: predisposing, nervous temperament and climacteric; exciting, death of husband and financial losses.

Family history good. Personal history: patient has been of nervous temperament and easily startled, but always strong and capable. Her husband died about ten years before her admission to the hospital, and money losses were sustained in the disposition of her estate. During the six months preceding admission she appeared in her usual health, except that on one or two occasions she seemed distracted. One week before admission active mental symptoms were noted, and five days later she became suddenly excited and delirious.

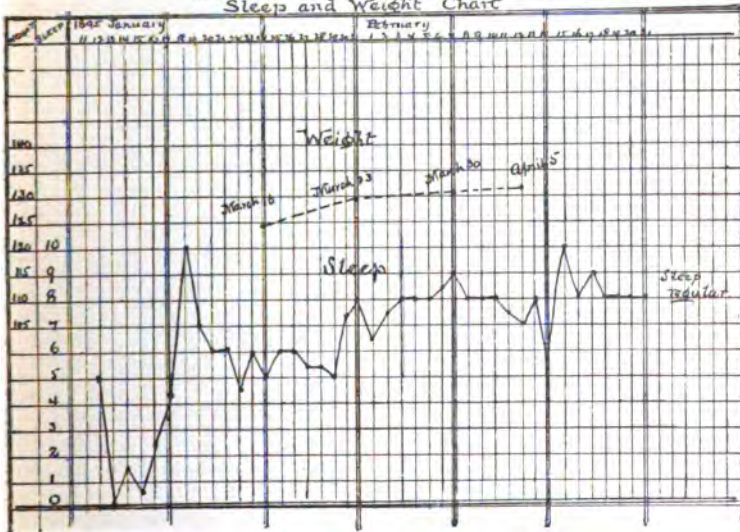
The features of the case devolved upon an accidental scald sustained during the administration of a bath on the evening of January 18th, seven days after admission. Febrile reaction followed and the patient was physically prostrated, but there was no active delirium after the day following the accident. The mental symptoms disappeared promptly but convalescence was somewhat prolonged during the healing of the superficial wounds. Patient was discharged recovered April 5, 1895, three months after admission.

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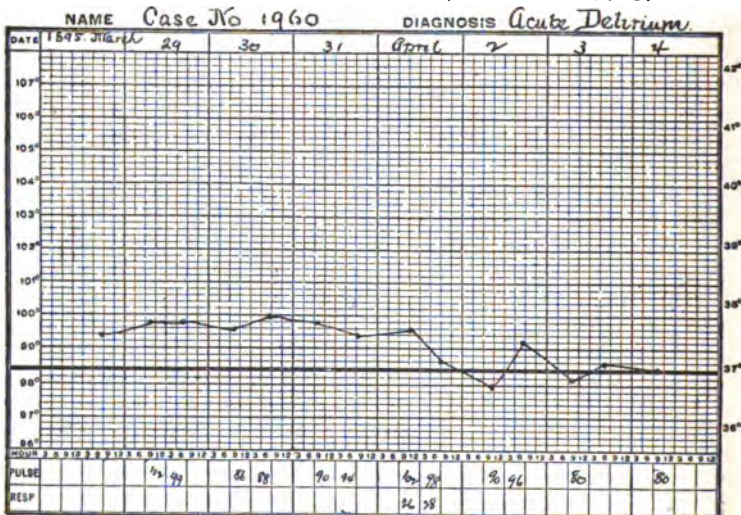
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Acute Delirium Name Case No. 1900 Continued Notes
Sleep and Weight Chart



CASE No. 1960.—Acute delirium complicated by excessive drugging.
 Woman; aged 19; single; nativity, New York; occupation, student;
 cause: overstudy. Family and personal history good.

The invasion was sudden and occurred two weeks before admission. The patient had been industrious at study and, as the first manifestation, she became loquacious and confused. In five days she had developed an actively delirious state. During the two weeks preceding admission, hypnotics had been administered in large doses, including bromide, morphine, sulfonal, and hyoscyamin; on the night before admission æther was administered. Patient had had quiet intervals but they had become less frequent. She had accepted all food but had rapidly emaciated. At the time of admission she was restless, active, incoherent, almost constantly in motion, and presented the usual physical manifestations of acute delirium. The pupils were so widely dilated that the red retinal reflex could be seen with the naked eye. Whisky was freely administered and on April 3d, five days after admission, the frenzy had changed to a state of exhilaration with rambling talk and laughter. After discontinuance of the stimulants this gradually ceased and the patient soon became intelligent and steady. Recovery was delayed by a period of relapse lasting about one week. Patient was discharged from the hospital June 7, 1895, ten weeks after admission.

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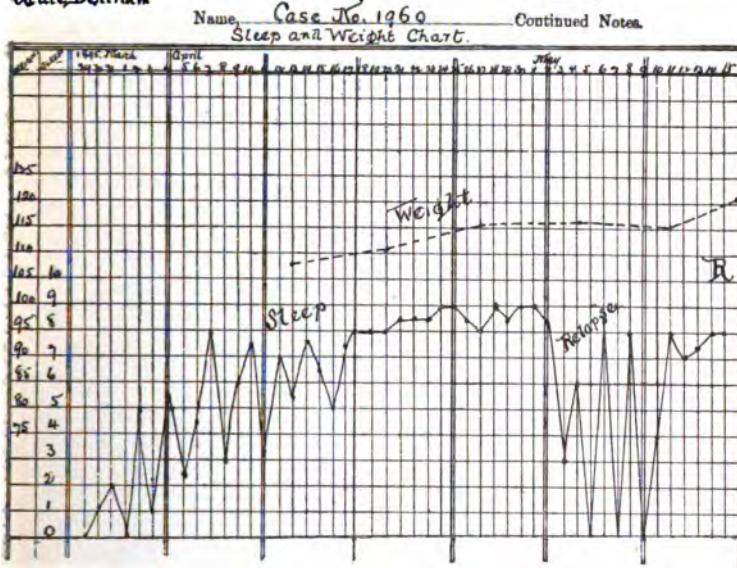


CASE No. 1856.—Acute delirium of puerperal origin. Relapse during attack of epidemic influenza, followed by recovery. Woman; aged 33; married; nativity, United States; occupation, housewife.

No history. Said to have been insane one week before admission. Patient was of large frame, of great strength, and weighed about 250

pounds. At time of admission the breasts were distended with milk. On account of her unusual strength, difficulty was experienced in caring for her, and the observation of symptoms was incomplete. She was admitted to the hospital November 10, 1894, and the excitement continued for about two months. There then developed acute parotitis

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of the left side and there was marked physical debility. During the period of excitement chloral was used. Upon the disappearance of the parotid swelling she became quieter but passed through a prolonged period of irritability and mental confusion with melancholy and a tendency to catalepsy. March 14th she was prostrated by epidemic influenza and reduced to a condition of critical debility with sleeplessness and refusal of food. Improvement began in the second week and convalescence followed. Patient was discharged recovered June 8, 1895.

CASE No. 2212—Acute delirium. Woman; aged 39; single; nativity, New York; occupation, domestic; alleged cause: continued excitement over religion.

Family history good. Personal history: patient reported to have been eccentric upon the subject of religion. Present attack followed the visit with "two ladies who called themselves faith curists," and the night before the attack, which began suddenly one week before her admission, she was said to have attended one of their meetings

devoted to prayer and song, "and the excitement was sufficient to bring about the present state of affairs." She then became excited and threatened violence and presented marked physical symptoms: "tenderness of spine, irritable stomach, constipation of bowels, coated tongue, and headache."

Patient was admitted to the hospital July 23, 1895, and the excitement continued for one week. She then obtained a fair amount of sleep and became quiet, dull and confused. In September she was convalescent, and at the time of this writing (October 1, 1895) arrangements have been made for her discharge, ten weeks after admission.

CASE No. 2168.—Acute delirium. Woman; aged 42; married; nativity, New York; occupation, housewife; causes: predisposing, heredity, apprehension of insanity; exciting, overwork and caring for sick husband.

Family history very bad: one brother and one sister now in St. Lawrence State Hospital; another brother has been insane; parricide has been committed by one member of the family; mother is a defective and in the county almshouse.

Personal history: patient is said to have had several previous attacks and to have been constantly apprehensive of insanity. At the time of admission, June 18, 1895, she had been insane for two weeks and had shown marked homicidal and suicidal tendencies, with rapidly developing incoherence and confusion, sleeplessness and loss of strength and weight. Under the usual treatment she responded slowly and at the time of this writing (October 1, 1895) she is stronger and able to be up and about every day, but is dull, confused and excitable, rarely speaking, and often attempting to injure herself.

CASE No. 1886.—Acute delirium with chronic nephritis and partial hemiplegia. Woman; aged 35; married; nativity, Canada; occupation, housewife. Alleged causes: frequent child-bearing, hemiplegia.

History: patient was reported to have been in poor health for years and to have been prostrated by an attack of hemiplegia in January, 1894. She had been submitted to worry over business matters. Two weeks before admission (December 21, 1894) excitement developed suddenly with paroxysms, usually in the afternoon, of great severity, and separated by intervals of stupidity. Albuminuria and casts were determined. Excitement subsided in two weeks and patient passed into a condition of uræmic stupor which continued for several months. Diuretic and laxative treatment with hydrotherapy were persistently applied, and at the time of writing patient is able to be up and about, answers simple questions, reads, but appears incapable of great mental effort, and is dull and inactive.

CASE No. 2230.—Acute delirium. Woman; aged 39; married; nativity, New York; occupation, housekeeper. Alleged causes: domestic troubles and desertion by husband.

Family history: mother died, aged 75, with senile dementia. History of patient's illness indefinite. Her disease was said to have begun ten days before admission to the hospital and had been characterized by great excitability and motor restlessness, religious delusions, incoherence of thought and speech and suicidal desire. There was marked physical prostration. The delirious condition lasted one week; patient then became dull and groaned a great deal. She has since become stronger and brighter, is up and about every day, answers simple questions with intelligence, smiles when talking, but still shows the post-insane hebetude. She was admitted to the hospital August 16, 1895, and at the time of this writing has been under observation six weeks.

CASE No. 2254.—Acute delirium. Woman; aged 47; single; nativity, Ireland; occupation, housekeeper. Alleged cause: menopause.

No history accompanied this patient except the indefinite statement that she had been maniacal and that the insanity had developed "a few months" before admission. She was admitted to the hospital September 11, 1895, in a delirious condition and became quiet in two weeks. Upon September 28th she was dressed and about the ward but she continues insomniac and depressed. She answers questions intelligently and her general condition is favorable.

ACUTE STUPOR—FIVE CASES.

Although there are too few cases of stupor to justify inviolate conclusions, their features appear to distinguish a separate class. In recent origin and in pronounced physical manifestations they approximate the conditions of acute delirium. From the latter they were distinguished by some slower development, by more profound mental "reductions",* by absence of remissions and by less favorable results. The element of combined physical and mental prostration separates them from other diseases of which stupor is an occasional accompaniment. From so-called stuporous melancholia they differ in genesis, in period of incubation, in duration, and in their course. The presence of engrossing delusions to which all other mental operations are subordinate was not determined.

* Bevan-Lewis: Text-Book of Mental Disease.

The occasional occurrence of temporary restlessness and agitation suggest more properly affinity with a general mental perturbation of acute delirium, which, in some cases, appeared during the initial stage.

Sustaining and stimulating methods of treatment were adopted. The difference in mental manifestations between the delirious and the stuporous states were regarded, and location upon an open ward rather than seclusion was thought to be desirable for its possible benefit in stimulation of object-consciousness.

CASE No. 1839.—Acute stupor with albuminuria. Woman; aged 37; married; nativity, New York; occupation, housewife.

No definite history accompanied this patient. Her mother and sister were said to have been insane, and the present attack to have existed for two months. At the time of admission she was stolid and stuporous and in poor physical condition. The pulse was feeble, rapid and its tension elevated. The tongue was parched and coated, and the bowels were loaded. She continued in this debilitated state for three months; she then changed suddenly, became bright and active, entered upon convalescence, gained in weight and strength, and on April 2, 1895, six months after admission, was discharged recovered. The albumin detected at first in the urine disappeared. The treatment included rest, quiet, tonic, stimulants and electricity.

CASE No. 1957.—Acute stupor with hystero-epilepsy and (probably) excessive drugging. Woman; aged 28; married; nativity, Canada; occupation, housewife.

No history accompanied the patient, except that attack of insanity began one month before admission. At the time of admission she was stuporous; the temperature was normal; pulse 88, feeble, and with elevated tension; pupils contracted and with limited reaction; skin anæmic; tongue moist, stained and coated; there was a thick secretion in the mouth and the breath was offensive. She was admitted to the hospital March 22, 1895, and on the evening of April 2d had two fits of hysterical character. She then improved rapidly and was discharged recovered April 20, 1895, one month after admission. Tonic and laxative treatment, including strychnine, iron and arsenic, was adopted.

CASE No. 2195.—Acute stupor. Woman; aged 35; married; nativity, Canada; occupation, housewife. Causes: care of insane husband and (probably) specific disease.

Patient was admitted to the hospital July 4, 1895, with a record of insanity of three months' duration. She had had the care of her husband, who was suffering from general paralysis and had been

TABLE No. 2.—ACUTE STUPOR.

Case No.	Rec.	Imp.	Death.	In Hospital Prospect.	Before Admission.	Under Treatment.	Gain in Weight.	Remarks.
1839	Yes.	....	....	.....	2 Montha.	5 1/2 Montha.	18 lbs.	
1957	Yes.	....	....	.....	1 Month.	1 Month.	16 lbs.	Bromiam; hystero-epilepsy.
2195	Yes.	....	Yes.	.....	3 Montha.	3 Montha.	.....	Specific.
1855	....	....	Yes.	.....	3 Montha.	20 Days.	.....	No autopsy.
2155	....	....	Yes.	.....	1 Month.	1 Month.	.....	Exhaustion.

Cases, 5. Recoveries, 3. Deaths, 2.

Percentage of recoveries, 60. Percentage of deaths, 40.

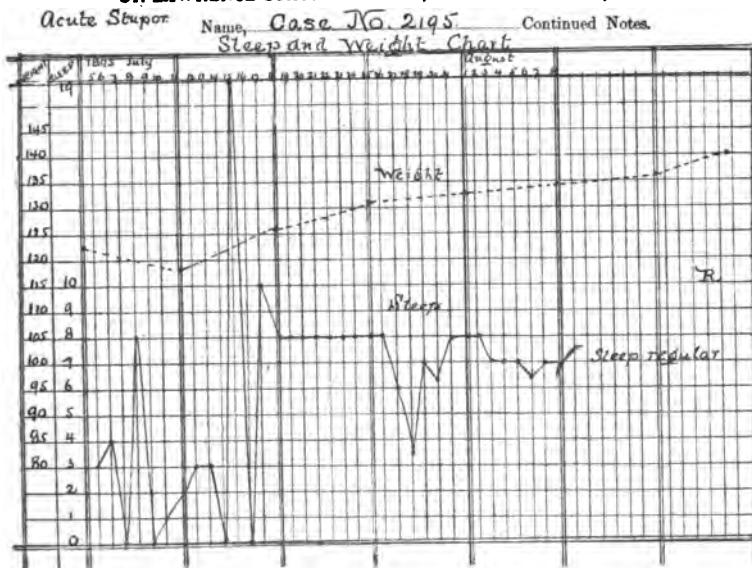
Average duration before admission, 2 months.

Average period under treatment of 3 recovered cases, 3 1/2 months.

Average gain in weight of 2 recovered cases, 17 lbs.

committed to an institution for the insane shortly before her admission. At the time of admission she was drowsy and dull, barely able to speak, and in poor physical condition. The temperature was sub-normal; the pulse rapid, irregular and of low tension; the pupils dilated and unequal; and the tongue irritable, swollen, furrowed, clean, moist and steady. Functional derangement of the heart was determined. The abdomen was solid and its percussion note flat. Acting upon the suggestion offered by the husband's disease, a course of anti-syphilitic treatment was experimentally adopted. Gastric irritability followed and was controlled by the exhibition of belladonna. On the morning of July 8th discoloration by blood was noticed from the angle of the mouth along the chin and on the bedding. The night nurse had not seen a convulsion.

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Physical examination:

Motion impaired.

Legs: Extension and flexion, with forced resistance, accomplished, showing fair strength on first attempt, with ensuing rapid exhaustion and great weakness.

Gait: Shuffling and staggering; Romberg's symptom present.

Sensation: Apparently normal as to quality and location.

Reflexes: Knee jerk present but not invariable—not elicited after two or three responses; ankle clonus absent; plantar reflex weak.

General condition: Quick exhaustion with preservation of function.

Patient now began to improve and after preliminary loss in weight gained in strength and nutrition. She was discharged September 21st, ten weeks after admission.

CASE No. 2155.—Acute stupor. Woman; aged 36; married; nativity, Pennsylvania; occupation, housewife. Cause: irregular menstruation and climacteric. (Early menopause a family trait).

Family history good. The first sickness was noticed May 16, 1895, and the first symptoms of insanity May 25. Patient thought she had done some great wrong and must kill herself to make it right. She attempted to drown herself, to cut her throat, and to hang herself. She was in a stuporous state at the time of admission, but by an effort was able to answer a few questions. The temperature was normal, the pulse rapid and feeble, the tongue coated, the eyelids were drooping and the eyes heavy and expressionless. The bowels were loaded. Patient failed rapidly and on July 10th was fed with the tube. The milk and whisky thus given were rejected. Lavage was then undertaken and an abundance of sour smelling, slimy mucus and two hardened and undigested milk curds were washed from the stomach. Predigested milk with whisky was then given through the tube and retained. This procedure was repeated at regular intervals but patient failed steadily, and on the morning of July 13th, died, five weeks after admission. Autopsy was not permitted.

CASE No. 1855.—Acute stupor with chronic nasal catarrh and hypertrophy. Woman; aged 46; married; nativity, New York; occupation, housewife. Alleged cause: injury.

Family history: one paternal aunt insane. The first symptom followed a fall from a ladder. Patient's back was injured and she lay helpless for some time. She complained of pain in the back and head and had been subject to periods of confusion in which she lost herself and was bewildered. She then became melancholy and attempted suicide. Stupor developed and continued with alternating periods of lucidity. The mental symptoms dated from four months before admission. When admitted she was stupid and debilitated. The tongue was clean and moist, the pulse feeble, circulation sluggish, temperature normal, and body emaciated. The abdomen was tense and the bowels were loaded. Albumen casts, blood, epithelium and leucocytes were found in the urine. Patient was given liquid diet, stimulants, iron and strychnine, and absolute rest in bed was enforced. She showed no tendency to improvement, failed steadily and died one month after admission. Autopsy was not permitted.

ACUTE AND SUB-ACUTE INSANITIES—FORTY-FIVE CASES.

The distinctions of the sub-acute and acute from the hyper-acute forms have already been indicated. Of the former, a few cases of special interest are appended, the tables and charts showing the general results of treatment in these more common forms of recent insanity. It has been found advisable to surround these patients with quiet and cheerful conditions, and to avoid classification upon the basis of turbulence or peacefulness. Sedatives were used in moderation where indicated, but most frequently sulfo-nal and trional were relied upon to promote sleep, together with hydrotherapeutic measures, muscular exercise and massage.

CASE No. 1951. Acute melancholia. Woman; aged 35; married; nativity, New York; occupation, housewife. Alleged causes: religious matters and uterine troubles.

Patient was first admitted to the hospital November 3, 1893, after an illness of three months' duration. She presented active, changeable personal delusions with aural hallucinations which gradually disappeared, and she was discharged June 5, 1894. She was readmitted March 15, 1895, with a repetition of the previous history and an impulse to drown herself and her child. She was in poor physical condition and appeared anæmic. Repeated examinations of the blood showed an average of three and one-half millions of red corpuscles, eight thousand leucocytes, and 45 per cent hæmoglobin. Stained specimens by both Reider's and Ehrlich's methods showed crenation and poikilocytosis of the red discs with occasional irregularities and disintegration of the neutrophilic white cell. Tonic treatment with arsenic and iron appeared of temporary benefit but the general course of the disease was unfavorable and during the last week in August the patient manifested the characteristic contractures and spasms of tetany. She failed rapidly and died September 5, 1895, after the development of hyperpyrexia. Autopsy was not permitted.

CASE No. 1933 and 1993. Acute melancholia with auto-intoxication. Woman; aged 29; married; nativity, Canada; occupation, housewife.

Patient was first admitted to the hospital February 19, 1895, with history of insanity of three and one-half months' duration. She was debilitated and stupid and writhed and groaned as if in great pain. The abdomen was very sensitive and she stated that there had been no evacuation from the bowels in a long time. She did not enter freely into conversation, and delusions were not ascertained. Atten-

TABLE No. 3.—ACUTE MELANCHOLIA.

Case No.	Rec.	Imp.	Death.	In Hospital Prospect.	Before Admission.	Under Treatment.	Gain in Weight.	Remarks.
1891	Yes.	....	....	....	2 Months.	2 Months.	?	Exophthalmic goitre. Stupor.
1934 and 1993	Yes.	....	....	....	3½ " "	8 " "	17 lbs.	Auto-intoxication. Lim'd delusion.
1973	Yes.	....	....	....	6 " "	5½ " "	10 " "	Second attack.
2000	Yes.	....	....	....	3 Weeks.	3 " "	26 " "	Puerperal.
2006	Yes.	....	....	....	10 Days.	3 " "	6 " "	Laceration of wrist. Second attack.
2027	Yes.	....	....	....	2 Months.	10 Weeks.	29 " "	Valvular disease of heart.
2158	Yes.	....	....	....	1 Year.	6 Months.	10 " "	Hysterical intention tremor.
2176	Yes.	....	....	....	3 Months.	7 Weeks.	17 " "	Nostalgia.
2216	Yes.	....	....	....	6 Months.	7 Weeks.	3 lbs.	Anæmia; irregular heart; phthisis.
2221	....	Yes.	Yes.	....	4½ " "	10 " "	....	Carcinoma; cerebral softening.
1838	....	....	Yes.	....	8 " "	2 Months.	....	Exhausted on admission. Drugging.
1951	....	....	Yes.	Poor.†	18 " "	6 Months.	....	Anæmia; tetany; exhaustion.
1854	....	....	....	Good.	6 " "	1 Year.	....	Dementia and fixed delusions.
1931	....	....	....	?	6 " "	8 Months.	....	Thyroid treatment.
2022	....	....	....	?	1 Year.	5 " "	....	Resistive and stuporous.
2174	....	....	....	Good.*	7 Months.	4 " "	....	Thyroid treatment.
2226	....	....	....	?	1 Year.	6 Weeks.	....	Goitre. Phthisis. Gaining rapidly.
2228	....	....	....	Good.*	8 Days.	6 " "	....	Suicidal frenzy.
2240	....	....	....	?	4 Months.	6 " "	....	Improving.
2256	....	....	....	?	Several Months.	6 " "	....	Bromism.
2260	....	....	....	?	2 Months.	6 " "	....	Delusions of persecution.
2265	....	....	....	?	6½ " "	3 " "	....	Improving.

* 2 cases to be soon discharged. † Chronicity established.

Cases, 23. Completed cases, 16. Recoveries, 10. Deaths, 3.

Percentage of recoveries to completed cases, 62½.

Average gain in weight of 7 recovered cases, 16½ lbs.

Average duration before admission, 5½ months.

Average period under treatment of 8 recovered cases, 4 months,

TABLE No. 4.—ACUTE MANIA.

Case No.	Rec.	Imp.	Death.	In Hospital Prospect.	Before Admission.	Under Treatment.	Gain in Weight.	Remarks.
1903	Yes.	....	....	....	10 Weeks.	5 Months.	14 lbs.	Latent phthisis.
1928	Yes.	....	....	....	6 Months.	4 "	30 "	Hysteria.
1935	Yes.	....	....	....	3 Weeks.	5 "	20 "	Specific.
1976	Yes.	....	....	....	1 Week.	6 "	35 "	"
1980	Yes.	....	Yes.	....	1 "	6 "	.....	Marantic thrombosis.
1863	....	....	....	Fair.	8 Months.	1 Year.	.....	Recovery from similar previous attack.
1841	....	....	....	Fair.	2 Weeks.	7 Months.	.....	"
1867	....	....	....	Fair.	10 Days.	1 Month.	.....	"
1944	....	....	....	Fair.	1 Month.	7 Months.	.....	Paroxysms of excitement; delusions.
2005	....	....	....	Poor.	2 Weeks.	5 Months.	.....	Improving.
2173	....	....	....	Good.	3 Days.	4 "	.....	Lactation. Second attack.
2214	....	....	....	Good.	6 Weeks.	3 Weeks.	.....	Practically recovered. Rheumatism.
2223	....	....	....	Good.	1 Week.	6 "	.....	Specific.
2233	....	....	....	?	A few days.	2 "	.....	Puerperal eclampsia.
2263	....	....	....	Hopeful.	5 Weeks.	4 Months.	.....	Goitre. Improving.
2159	....	....	....	Good.	1 Month.	4 Months.	.....	"

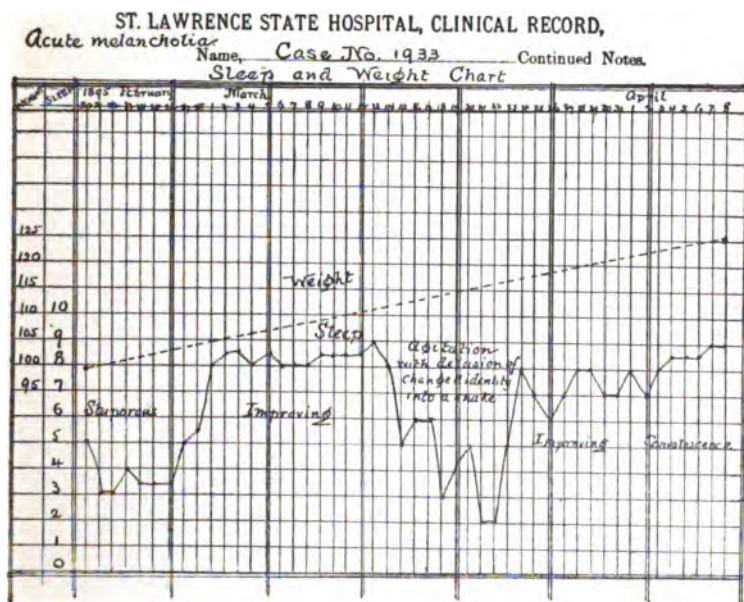
Cases, 16. Completed cases, 6. Recovered, 5. Died, 1. Percentage of recoveries to completed cases, 83.
 Average gain in weight of five recovered cases, 24 lbs. Average duration before admission, 6 weeks.
 Average period under treatment of five recovered cases, 5+months.

TABLE No. 5.—SUB-ACUTE INSANITY.

Case No.	Rec.	Imp.	Death.	In Hospital Prospect.	Before Admission.	Under Treatment.	Gain in Weight.	Remarks.
2006	....	....	....	Poor.	1 Month.	5 Months.	.....	Dementia.
2192	....	Yes.	....	....	6 Weeks.	4 Weeks.	.....	Incurable phys'n disease. Rem'd prematurely.
1824	Yes.	....	....	....	8 Months.	4 Months.	5 lbs.	Organic heart disease.
2210	Yes.	....	....	....	4 "	10 Weeks.	8 "	Second attack. Chronic rheumatism.
1954	....	....	....	....	14 "	3 "	.....	Active neurasthenia. Removed prematurely.
2224	....	Yes.	....	....	5 "	3 "	8 lbs.	Removed prematurely.

Cases, 6. Recovered, 2. Improved, 2. Deaths, 0. Average duration before admission, 8½ months.

tion was directed to the enteric condition and scybalous masses were at once removed. Improvement began promptly but patient showed some mental weakness and soon expressed the idea that she was a source of contamination to others and that she should be removed from the hospital. Later her conversation continually turned to the subject of snakes; at first she said that she was full of snakes, that her fingers and toes were snakes, and finally that she herself was a snake. These delusions were partially controlled and against the advice of her physicians, she was prematurely removed from the hospital by her husband. Upon her return home she acted upon her delusions, left the house and crept and rolled about on the ground in verification of her idea. She was recommitted to the hospital in four days. After an initial period of debility and confusion she again improved, her delusions disappeared, and on August 29th, 1895, six months after the first admission, she was discharged recovered. During treatment in the hospital she gained in weight twenty pounds.



CASE No. 2158.—Acute melancholia. Woman; aged 30; married; nativity, unascertained; occupation, housewife. Alleged cause: ill-health following child-birth.

Patient was said to have been insane for three months before admission to the hospital. At the time of admission she was depressed and debilitated but intelligent. Her condition was then complicated

by functional intention tremor, which disappeared in a few days.* The treatment adopted included tonics, stimulants, massage, electricity and quiet. Patient improved steadily and was discharged recovered after ten weeks, having gained in weight ten pounds. Her improvement in physical health continued after her discharge from the hospital

CASE No 1955.—Acute mania. Woman; aged 48; widowed; nativity, Ireland; occupation, housekeeper. Exciting cause: syphilis.

At the time of admission she was in fair physical condition and in a state of active mania. Under specific treatment she improved rapidly, gained in weight twenty pounds and was discharged recovered in five months.

CASE No. 1976.—Acute mania. Woman; aged 34; married; nativity, Vermont; occupation, prostitute.

Patient was admitted in a state of active mania with slight physical deterioration. She was said to have been insane for one week and showed marked delusions of exaltation. She was placed upon a course of specific treatment and improved rapidly, gaining in weight in five months, twenty pounds.

CASE No. 1863.—Acute mania. Woman; aged 41; married; nativity, Ireland; occupation, housewife. Alleged cause: family troubles, death of son.

No history accompanied the patient. She was actively excited at the time of admission and afterwards was subject to sudden outbreaks of mental and motor disturbance with resistance to care and the appearance of controlling delusions, which were not expressed. She did not improve.

She was admitted to the hospital November 14, 1894. In May, after a prolonged period of excitement, she became depressed and remained in bed. During the last week in May she suffered from severe and intractable diarrhoea. On the morning of May 30th, her right leg became suddenly cold, pale and paralysed, with some cyanotic discoloration. No heart murmur was detected. The pulse was weak and the temperature varied from 99 to 101 degrees during the day. Urinalysis revealed urates and albumen. On the following morning, at half past seven o'clock, she collapsed, the heart beat could not be determined, the pupils were widely dilated, the skin became sallow and livid, there were a few gasps and without convulsion or coma she died in an hour.

The autopsy showed general sclerosis of the brain; thrombosis of the great longitudinal sinus; gangrenous enteritis; and thrombosis of the right popliteal artery. Search for a plug in the abdominal vessels was unavailing although its existence was strongly indicated.

* Dr. James Hendrie Lloyd: "Hysterical Tremor and Hysterical Anorexia."—*American Journal of the Medical Sciences*, July, 1893.

TABLE No. 6.—SUMMARY.

	Delirium.	Stupor.	Melancholia.	Mania.	Sub-acute Forms.	Totals.
Cases.....	9	5	23	16	6	59
Completed cases.....	7	5	16	6	3	37
Recoveries.....	5	3	10	5	2	25
Per cent. recoveries on completed cases.....	71½	60	62½	83½	66½	67½
Deaths.....	.....	2	3	1	.....	6
Per cent. deaths.....	.....	40	14	6	.....	10
Average gain in weight of recovered cases....	11 lbs.	17 lbs.	16½ lbs.	24 lbs.	6½ lbs.	15 lbs.
Duration before adm....	9 days.	2 m'ths.	5½ m'ths.	6 weeks.	8¾ m'ths.	33-5 m'ths.
Period under treatment of recovered cases....	14 w'ks.	3 m'ths.	4 m'ths.	5 m'ths.	14 w'ks.	4 m'ths.

The preceding tables have been made upon the basis of completed cases with the purpose of avoiding the element of probability. The results are not at variance with those previously published,* but verify them by greater detail. Of necessity they included cases admitted to the hospital during the last months of the fiscal year, as well as during the earlier period. They reveal the impossibility of securing definite data in the space of a year, relating to diseases whose natural course covers a greater time. This uncertainty is especially shown in cases 1841 and 1867, admitted at the beginning of the year and not yet determined. These patients have both passed through attacks of acute mania of prolonged duration and have attained the state of post maniacal hebetude, in which the forecast for chronicity or cure is involved in obscurity. Further study of these cases during the succeeding year will remove many elements of doubt and render insignificant the number of uncompleted cases.

Gynæcological complications have not been discussed, because there have been no cases whose gynæcological aspects appeared directly related to the course of the disease. The minor ailments of women have had proper attention and treatment, and their correction has been a factor in the restoration of health.

It has been sought by this paper to remove the uncertainties of statistics by the consideration of individual cases, and to emphasize the curative and hospital functions of an institu-

* St. Lawrence State Hospital, Sixth and Eighth Annual Reports.

tion for the insane. In some measure is revealed the great demand made by the recoverable class of patients; the need of close physical diagnosis, of the arrangement of wards for isolation and separation of disquieting elements, refinement of diet and skilful attention of qualified trained nurses. The success has been encouraging and the results justify the still greater development of the medical work of the institution. The hope may be indulged that the attention of the practicing physician will be attracted and the public hospitals for the insane shall receive, as is their due, the emphatic and steady support of the general profession.

FAT AS A FACTOR IN THE CURE OR CONTINUANCE OF INSANITY.

BY SELDEN H. TALCOTT, A. M., M. D., PH. D.,
Medical Superintendent, Middletown State Homeopathic Hospital.

Nothing is more palpable than a clinical observation of fat. Its presence is self-demonstrated and readily discerned. Its necessity as a factor in the promotion or continuance of health is regarded by some as an axiom.

Still, fat may be an evidence of physiological normality, or it may be an evidence of pathological degeneration.

As a factor in the cure of mental disorder, it takes high rank in the judgment of some of our most distinguished alienists. Dr. T. S. Clouston, Superintendent of the Morningside Asylum, near Edinburgh, Scotland, asserts that "every pound of body-weight gained means a gain in nervous and mental tone." This is usually true of cases which are actually recovering. But what shall we say of those insane persons who increase largely in weight during the progress of their disease, and yet present to the observer no gain in mental or nervous tone, but rather a marked loss of both nerve tonicity and mental power?

While Dr. Clouston's statement is true in many cases, its universal acceptance must be denied when we consider

the remarkable increases of weight in chronic demented, whose "nervous and mental tone" was practically abolished while making their bodily gains.

We propose, in this paper, to present the body-weight records of one thousand and one cases, (501 recovered, 500 not recovered) tabulated in such a way as to show, among those recovered, the average weight on admission, the average weight at the end of the first month under treatment, and the average weight when discharged.

We shall also present in a similar way the weights of 212 cases suffering with acute mania, and 204 cases suffering with acute melancholia, and 84 cases suffering with various and special forms of insanity, the latter being classified in these tabular statements as "miscellaneous insanities, recovered."

We shall also present the weights of a few acute cases which made remarkable bodily gains and recovered.

We shall likewise submit a table showing the proportion of gains, losses, and stationary conditions in 100 acute cases that recovered.

A special case of melancholia with stupor is given, and it shows an enormous gain in a very short period of time.

On the other hand, we present a list of 500 chronic cases which did not recover. These patients show a general gain in weight for a time, and then a slow gradual loss in weight, as a process of physical and mental degeneration supervened instead of a process of recuperation.

We also give some remarkable gains in weight, of a few chronic cases which failed to recover.

GENERAL LIST.

ACUTE CASES, RECOVERED

234 Male Cases.

Average weight on admission.....	138 pounds.
Average weight end of first month.....	140 "
Average weight on discharge.....	155 "
Total gain in weight.....	3,824 "
Average gain for each person in weight.....	16 "

266 Female Cases.

Average weight on admission.....	117 pounds.
Average weight end of first month.....	116 "
Average weight on discharge.....	128 "
Total gain in weight.....	2,884 "
Average gain for each person in weight.....	11 "

500 Male and Female Cases.

Average weight on admission.....	127 "
Average weight end of first month.....	127 "
Average weight on discharge.....	140 "
Total gain in weight.....	6,708 "
Average gain for each person in weight.....	13 "

FORM OF INSANITY—MELANCHOLIA ACUTE, RECOVERED.

81 Male Cases.

Average weight on admission.....	140 "
Average weight end of first month.....	140 "
Average weight on discharge.....	155 "
Total gain in weight.....	1,270 "
Average gain for each person in weight.....	15 "

123 Female Cases.

Average weight on admission.....	117 "
Average weight end of first month.....	116 "
Average weight on discharge.....	127 "
Total gain in weight.....	1,179 "
Average gain for each person in weight.....	10 "

204 Male and Female Cases.

Average weight on admission.....	126 "
Average weight end of first month.....	125 "
Average weight on discharge.....	138 "
Total gain in weight.....	2,449 "
Average gain for each person in weight.....	12 "

FORM OF INSANITY—MANIA ACUTE, RECOVERED.

107 Male Cases.

Average weight on admission.....	135 "
Average weight end of first month.....	137 "
Average weight on discharge.....	153 "
Total gain in weight.....	1,875 "
Average gain for each person in weight.....	18 "

105 Female Cases.

Average weight on admission.....	118	pounds.
Average weight end of first month.....	118	"
Average weight on discharge.....	130	"
Total gain in weight.....	1,248	"
Average gain for each person in weight.....	.12	"

212 Male and Female Cases.

Average weight on admission.....	127	"
Average weight end of first month.....	128	"
Average weight on discharge.....	141	"
Total gain in weight.....	3,123	"
Average gain for each person in weight.....	14	"

MISCELLANEOUS INSANITIES, RECOVERED.

48 Male Cases.

Average weight on admission.....	137	"
Average weight end of first month.....	141	"
Average weight on discharge.....	152	"
Total gain in weight.....	699	"
Average gain for each person in weight.....	15	"

36 Female Cases.

Average weight on admission.....	119	"
Average weight end of first month.....	120	"
Average weight on discharge.....	132	"
Total gain in weight.....	457	"
Average gain for each person in weight.....	13	"

84 Male and Female Cases.

Average weight on admission.....	130	"
Average weight end of first month.....	131	"
Average weight on discharge.....	143	"
Total gain in weight.....	1,156	"
Average gain for each person in weight.....	14	"

REMARKABLE GAINS.

ACUTE CASES, RECOVERED.

8 Male Cases.

Average lowest weight.....	123	pounds.
Average highest weight.....	177	"
Total gain in weight.....	427	"
Average gain for each person in weight.....	53	"

5 Female Cases.

Average lowest weight.....	99 pounds.
Average highest weight.....	151 "
Total gain in weight.....	260 "
Average gain for each person in weight.....	52 "

13 Male and Female Cases.

Average lowest weight.....	114 "
Average highest weight.....	167 "
Total gain in weight.....	689 "
Average gain for each person in weight.....	53 "

REMARKABLE GAINS.

ACUTE CASES, RECOVERED.

8 Male Cases.

Case No.	Age.	Weight on admission.	Weight one month after admission.	Weight when discharged.	Gain, lowest to highest weight.
6	24	110 pounds.	105 pounds.	160 pounds.	55 pounds.
39	50	104 "	136 "	186 "	82 "
71	28	132 "	131 "	179 "	48 "
844	48	110 "	106 "	141 "	35 "
2,157	34	166 "	153 "	203 "	50 "
184	26	138 "	140 "	192 "	54 "
2,436	46	137 "	140 "	185 "	48 "
872	70	112 "	114 "	167 "	55 "

5 Female Cases.

61	50	107 "	98 "	147 "	49 "
70	36	91 "	91 "	144 "	53 "
569	34	121 "	109 "	170 "	61 "
72	43	107 "	112 "	155 "	48 "
79	18	115 "	93 "	140 "	47 "

8 Male Cases.

Lowest weight.	Highest weight.
105 pounds.	160 pounds.
104 "	186 "
131 "	179 "
106 "	141 "
153 "	203 "
138 "	192 "
137 "	185 "
112 "	167 "
<hr/> 986	<hr/> 1,413

5 Female Cases.

Lowest weight.	Highest weight.
98 pounds.	147 pounds.
91 "	144 "
109 "	170 "
107 "	155 "
93 "	140 "
<hr/> 498	<hr/> 756

PROPORTION OF GAINS, LOSSES, AND STATIONARY CONDITIONS IN 100
ACUTE CASES THAT RECOVERED.

83 Cases Gained.

Average weight on admission.....	114 pounds.
Average weight end of first month.....	113 "
Average weight on discharge.....	127 "
Total gain in weight.....	1,079 "
Average gain in weight for each person.....	13 "

12 Cases Lost.

Average weight on admission.....	139 "
Average weight end of first month.....	136 "
Average weight on discharge.....	133 "
Total loss in weight.....	72 "
Average loss in weight for each person.....	6 "

5 Cases Remained Stationary.

Average weight on admission.....	135 "
Average weight end of first month.....	136 "
Average weight on discharge.....	135 "

SPECIAL CASE OF MELANCHOLIA WITH STUPOR, RECOVERED.

Case No. 747.

Age, 46.

Weight, April 5th, 1881, 64 pounds.

Weight May 3d, 1881, 108 pounds, showing a gain of 44 pounds in 28 days.

Discharged in good health June 20th, 1881, weighing 144½ pounds, a gain of 80½ pounds in two and a half months.

This patient doubled her weight in two and a half months, and laid on 16½ pounds of flesh besides. In the race for fat she could give pointers to the Empire State Express!

CHRONIC CASES, NOT RECOVERED.

261 Male Cases.

Average age.....	41 years.
Average weight on admission.....	138 pounds.
Average highest weight.....	145 "
Average weight on discharge.....	141 "
Total gain, highest weight.....	1,827 "
Total gain in weight on discharge.....	783 "
Average gain on highest weight for each person.....	7 "
Average gain on discharge for each person.....	3 "

239 Female Cases.

Average age.....	42 years.
Average weight on admission.....	116 pounds.
Average highest weight.....	124 "
Average weight on discharge.....	123 "
Total gain, highest weight.....	1,912 "
Total gain in weight on discharge.....	1,673 "
Average gain on highest weight for each person.....	8 "
Average gain on discharge for each person.....	7 "

500 Male and Female Cases, Combined.

Average age.....	41 years.
Average weight on admission.....	127 pounds.
Average highest weight.....	135 "
Average weight on discharge.....	132 "
Total gain highest weight.....	3,949 "
Total gain in weight on discharge.....	2,450 "
Average gain on highest weight for each person.....	8 "
Average gain on discharge for each person.....	5 "

REMARKABLE GAINS.

CHRONIC CASES, NOT RECOVERED.

6 Female Cases.

Case No.	Age.	Weight on admission.	Weight one year after admission.	Weight when discharged.	Gain, lowest to highest weight.
827	22	97 pounds.	112 pounds.	150 pounds.	53 pounds.
364	45	95 "	169 "	170 "	75 "
599	57	86 "	156 "	155 "	69 "
858	33	141 "	172 "	195 "	54 "
994	48	108 "	168 "	175 "	67 "
3,591	42	129 "	277 "	318* "	189 "

4 Male Cases.

358	59	150 "	215 "	248 "	98 "
462	11	90 "	144 "	155 "	65 "
266	16	134 "	216 "	196 "	62 "
228	40	162 "	219 "	216 "	54 "

4 Male Cases

Lowest weight.	Highest weight.
150 pounds.	248 pounds
90 "	155 "
134 "	216 "
162 "	219 "

536

838

6 Female Cases.

Lowest weight.	Highest weight.
97 pounds.	150 pounds
95 "	170 "
86 "	156 "
141 "	195 "
108 "	175 "
129 "	318 "

656

1,164

* This case is still at the hospital, and is now improving mentally to a marked extent. This patient deserves recovery.

REMARKABLE GAINS.

CHRONIC CASES, NOT RECOVERED.

4 Male Cases.

Average lowest weight.....	134 pounds.
Average highest weight.....	209 "
Total gain in weight.....	300 "
Average gain for each person in weight.....	75 "

6 Female Cases.

Average lowest weight.....	109 "
Average highest weight.....	194 "
Total gain in weight.....	510 "
Average gain for each person in weight.....	85 "

10 Male and Female Cases.

Average lowest weight.....	119 "
Average highest weight.....	200 "
Total gain in weight.....	810 "
Average gain for each person in weight.....	81 "

In reviewing these tables, we find some highly interesting, even if not very enlightening facts. Those cases which became chronic and did not recover would, as a rule, gain in bodily weight for a time and then slowly lose. Instead of recuperating they gradually degenerated, both physically and mentally. Those cases which recovered, however, continued steadily (after fairly commencing improvement) to gain in weight until the normal mental health was fully restored.

Why one person recovers with an increase of bodily weight, and another runs into a chronic condition with an equally large gain in flesh, is a matter that is difficult to explain or understand. We believe, however, that recovery occurs, after severe illness, only when the forces of the spirit regain their customary elasticity, hopefulness, and ambition; while in those cases which drift into dementia, there has been what might be termed a "necrosis of the animal spirits," or a sullen Lethe of the human mind. This latter condition presents an eating and half-breathing but unthinking animal, as a substitute for what was once a bright and sentient being.

But whatever may be our opinion or theory relative to the recuperating powers of the spiritual as well as the vital forces, we are sure (and I think it will be generally conceded) that a certain amount of fat is required for the protection of the human system, and its intricate and complicated arterial, and glandular, and nervous, and muscular, and bony component parts.

The preceding tables prove that a restoration of the insane to health is generally accompanied by a gain in bodily weight.

In the young, a moderate amount only of fat is needed, because the facilities for replacing wastes are greater in youth than in old age.

Among the aged, accumulations of fat are needed for two reasons:

(1) The restoration and re-toning of nerve tissue is slower than in the young; and (2) An increased amount of fat is specially needful for the protection of the body when it begins to feel the slow but sure waning of the forces of life.

Every careful observer, both of those who are in full and ruddy health, and those who are sick and under clinical observation, must have noticed the reserve powers of fat. In health, the supply is generally stationary, the accumulation being somewhat increased during the winter months, and moderately diminished during the heat of summer.

The fat that is stored up within the human temple constitutes both an enveloping and warming blanket; and also it may be considered as a coal-heap full of heat resource for the entire system. It not only protects by its enveloping and non-conducting properties, but it acts, likewise, as a fuel with which to warm the inner man whenever a draft is made upon it for that purpose. This point is fully illustrated by the hibernating habits of the bear.

In the care of the insane, we observe that a large proportion of the cases sent to us for treatment suffer with quite severe losses of fat. This is especially true of those who have acute mania, or melancholia with agitation and resistance.

To repair these losses as quickly and surely as possible, is the special mission of the curative hospital. Drugs may do something to relieve the various forms of nerve tension or nerve relaxation, but food alone can rebuild and recuperate those worn and exhausted patients who have not only been bereft of their reason, but likewise have been despoiled of their natural covering of fat.

In order to attain the desired end, and effect a restoration of the individual to customary health and happiness, we must administer a fat-producing diet; and it must be given under such conditions as to favor easy digestion and rapid assimilation; and yet in such a way as to avoid all tendencies to clogging of the conduits of repair. Clogging might occur if the food was thick, rich, heavy, and hard to digest.

To meet all the requirements, we must administer fat as it is found in milk, eggs, butter, rich soups, vegetable oils, and meats containing fat. The use of abundant quantities of pure water in conjunction with proper food, is an aid to the accumulation of fat substances in the human system.

Some time ago, we established a dietary, for the hospital wards, which was especially adapted to the end in view—namely to increase the body-weight of our patients. While we seek to give as much variety as may seem practicable, we hold that the great essential in the task of fattening the insane is a diet which, for the most part, is served hot, and in a liquid and semi-liquid form.

We present herewith a hospital dietary for two days:

Breakfast—Bread and butter, graham mush cooked with milk, hot or cold milk, coffee, toast.

Dinner—Soup (tomato, pea, bean or vegetable) with small pieces of beef, or mutton, or chicken in the soup, rice, toast, hot or cold milk, bread and butter, bread pudding, fruit, lettuce salad with oil.

Supper—Bread and butter, tea, boiled rice, hot or cold milk, toast, cheese.

Breakfast—Bread and butter, cracked wheat, coffee, soft boiled eggs, toast, hot or cold milk.

Dinner—Roast beef, soup (cream of celery, potato, or corn), boiled rice, bread and gravy, toast, hot or cold milk, fruit, nuts, and celery or lettuce.

Supper—Bread and butter, toast, sauce, tea, hot or cold milk.

Hot milk is also given between meals, and in the night, when necessary.

Under the influence of a diet similar to the foregoing, 50 patients gained 200 pounds in one month, an average gain of 4 pounds for each patient. In another hospital ward 34 patients gained 152 pounds, which is an average gain of about $4\frac{1}{2}$ pounds per patient. Many of these patients were chronic cases, and a gain in weight was not likely to occur except by a marked change in the diet.

In order to acquire fat in health, one must subsist upon a varied diet—that is, a diet which contains a fair proportion of fat, of starch, of sugar, and of other foods which contain the necessary compounds with which to upbuild and support all the constituents of the body.

Much of the food for fattening purposes should be suitably prepared in a semi-liquid form, and every food preparation should be properly heated, in order to avoid the unnecessary consumption of carbon.

A reasonable amount of fat having been accumulated, suitable food must be continued regularly, in order to preserve that which has been gained, and to make up for wastes which are always going on.

To restore fat which has been lost by the victim of disease, we must increase the proportion of fat in the food, in order to effect the gain desired, and this fat must be so emulsified and liquified that it may easily be transformed, in the digestive and assimilative organs, into blood, the life-giving and life-restoring fluid.

In making our observations of the insane, we find that there are two general classes of cases:

- (1.) Those who gain in weight and recover;
- (2.) Those who become fat and pass into the chronic state, and at last gradually lose a marked proportion of what they have gained.

We have three kinds of recoveries:

- (1.) Those who recover their mental poise and gain in bodily weight.
- (2.) Those who recover without any change from the normal weight.
- (3.) Those who recover, and at the same time lose in bodily weight.

We find, on consulting the table, that the five hundred cases which recovered show an average percentage of gain of 13 pounds each. In the five hundred chronic and unrecovered cases there was an average gain of five pounds at the end of the treatment and care. Among the remarkable gains, we have in ten chronic cases an average increase in weight of 81 pounds, while in 13 recovered cases there was an average increase in weight of 52 pounds per patient.

From our own observations, and tabulated records, we are obliged to conclude that bodily gains must be synchronous with the gradual return of the mind to normal action. The drift toward sanity must be parallel with and closely allied to the drift toward that increase of fat which brings the body up to the natural weight, or a little beyond. If the natural spirits lag, or the mental action remains confused or disordered while the patient is growing fat, then the case will probably become chronic and incurable. When the forces of body, mind and spirit, which have been swept down by the storms of disease, do not rise and walk together simultaneously in their return to the heights of health, then they are not likely to harmonize or recuperate at all.

When one patient gains fifty pounds in weight and recovers, we sing serenely of the rich efficacy of fat. But when another patient gains seventy-five pounds in weight, and sinks into the hopeless slough of dementia, we bow our heads with solemn thoughtfulness, and consider the disability of fat.

Why do we have these apparently paradoxical results from similar conditions? Here we have to consider the

quality, the tone, the timbre, the elasticity, and the adaptability of the mind and the soul to certain states of the body. In one instance, the cyclone of disease merely prostrates its victim temporarily, and then, like the mountain ash, this elastic and exuberant soul rises again, and foregathers once more with the recuperating powers of the physical structure.

In another case, the powers of the mind and the soul are inelastic, and when swept down by "forbidden and abhorrent forces" they remain prostrate upon the earth. The body of this latter victim may be favored with gains of fat, but the former mental and spiritual occupants of that disordered temple have no more power, or coherency, or recuperative force than a rope of sand. These are, perhaps, fanciful deductions; but they arise from practical clinical observations. If they can be explained upon any other hypothesis by a more practical observer, we shall be glad to see the explanation. The influence of fat as a protector has been briefly considered. From another point of view, we may state that fat is a beautifier; and hence, as a restorative of the insane, we may say that it stimulates woman, and encourages her recovery. It is true as a clinical observation, that when insane women renew operations before the looking-glass, and brush and curl and crimp their hair, and wash and powder their faces, and smooth out every wrinkle by happy accumulations of fat, they give forth increasing evidences of returning health. When a woman who has long been sick and depressed in heart, and wrinkled in countenance, begins to improve, and takes her accustomed stand before the reflecting mirror, and sees in her face a renewal of those lines of beauty which Hogarth saw in every redundant curve, then she takes new courage, and sets sail once more, with pride and joy, upon the ever-changing sea of fashion. Those who are really healthy always desire to keep "in the fashion."

Fat removes deep lines and angles and creases from the forehead, and the corners of the eyes. It multiplies curves, and increases the beauty of the human form; con-

sequently it becomes a most important factor in the cure of the insane from an æsthetic as well as a hygienic standpoint. Whenever fat gladdens the soul of woman, or stirs the heart of man, it accomplishes a mighty mission in the work of curing mental invalids.

POST-FEBRILE INSANITY.

BY CHAS. W. PILGRIM, M. D.,

Medical Superintendent, Hudson River State Hospital, Poughkeepsie, N. Y.

Post-febrile insanity is the name which was given by Dr. Skae of Edinburgh to insanity, no matter what might be its form, occurring during the exhaustion following fevers, but later observers demonstrated that it might occur:

First, As the earliest symptom;

Second, During a later stage, or the height of a fever;

Third, During convalescence.

As above stated, Dr. Skae recognized only the last form and there is no doubt that it is the most common and probably the only form which is apt to come under the observation of hospital physicians.

This form of insanity has been observed and written upon by nearly all writers upon insanity, and although not very frequent, it seemed to me that it would be of enough interest to justify a short paper upon it. With this object in view I have made a careful examination of the records of the Hudson River State Hospital since its opening and find that out of more than six thousand admissions, twenty-four only could be positively said to be due to exanthematous fevers. Thirteen were caused by typhoid, nine by scarlatina and two by small-pox.

I might have added several cases to my list had I included those in which the fever occurred from two to twenty years before the development of insanity, and which by friends was considered the cause, but all such cases have been discarded and only those have been considered where the relation between the fever and the insanity was per-

fectly clear. Cases due to pneumonia, rheumatism and malarial fevers have likewise been excluded as have also those due to the grip when melancholia so frequently developed as a result of the epidemics of influenza during 1890, '91 and '92.

An analysis of the thirteen cases due to typhoid fever showed that the sexes were quite evenly divided, six having occurred in men and seven in women. Six were between ten and twenty years of age when the fever occurred, four were between twenty and thirty and three were between thirty and forty. In every instance the insanity developed during convalescence.

In five cases the symptoms were those of acute melancholia, in two acute mania, two chronic melancholia, two chronic mania and two dementia. The results were as follows: Two died, both of whom had melancholia; four recovered and remained well so far as is known; one recovered, relapsed and again recovered; one recovered and relapsed; one improved enough to be sent to her home in Ireland, and four made no improvement whatever—three being still here. In four cases hereditary predisposition was well marked.

We thus see that the results were exactly what might have been expected from the forms of insanity from which they suffered, two of the acute cases dying of exhaustion, the other cases recovering or improving, and the cases of chronic mania and dementia ending in hopeless chronicity.

Of the nine cases due to scarlatina, four occurred in males and five in females. In every case the scarlatina occurred in infancy or childhood and in seven cases there was arrest of development, with convulsions in two cases and deafness in two others. In two cases (both females) the form of insanity was paroxysmal, and characterized by irritability and violence, while in all the others it was characterized by obtuseness of intellect or mild dementia. The results were most discouraging, for only one improved sufficiently to go home while the remaining eight are still here or in other institutions. Heredity was marked in three cases. In every instance the patients were said to have

been of ordinary brightness before the attack of scarlatina.

The two cases due to variola were in men, and were admitted during the past two years. The insanity occurred during convalescence in both cases, and was characterized by the silliness, obtuseness and peculiar physiognomy mentioned by Régis. Neither has made any progress towards recovery and the outlook in both cases is extremely unpromising.

I could not find among the records any case ascribed to measles.

While the foregoing statistics show a very small percentage of cases of insanity due to the exanthemata I believe they fairly represent the comparative frequency of typhoid fever, scarlatina and variola as direct causes of mental affections.

Clouston in an examination of more than a thousand cases sent to the Carlisle asylum, found only seven due to the three fevers mentioned. Some European observers report a much larger proportion, as, for instance, Nasse who found forty-three cases in two thousand patients, and Schlager who found twenty-two cases in five hundred patients. Christian on the other hand, whose compilations were undoubtedly made with great care, found only eleven cases in two thousand patients. Some of this discrepancy is probably due to the fact that some observers, notably Nasse, classify even "a prolongation of delirium" among the mental affections originating in fevers.

In regard to the prognosis, which is always the most important question to the friends and family physician, observers express very dissimilar opinions. Régis says for instance that "in spite of the bodily debility that accompanies this condition and in spite of the apparent gravity of the attacks they generally end in recovery, and it is the rule to see the insanity of typhoid fever disappear. It is only in rare cases that it persists and passes into the chronic condition." My own investigations, which show a result of two deaths and four cases of chronicity in a total of

thirteen, would seem to lead to different conclusions. Clouston's observations are quite similar, as only one case due to scarlatina among those examined by him recovered. Again Régis says that "the eruptive fever most frequently complicated with insanity is variola," and "the prognosis is generally good and the attack is commonly recovered from." Here again Clouston disagrees with him and says that "the form of insanity that follows small-pox is of the same character as that of scarlatina, but it is even more incurable." My own limited experience with the two cases referred to would bear out the latter statement.

I have quoted from Régis and Clouston because they represent the latest expressions upon the subject of insanity and also because they are so diametrically opposed in their statements.

In conclusion, then, from the fact that insanity usually develops during convalescence we may concur in Greenfield's opinion that it bears no relation to the intensity of the fever but results rather from perverted nutrition and an impoverished condition of the nerve cells. We may also conclude, I think, that about fifty per cent of the cases due to typhoid fever will recover, while twenty per cent will die from exhaustion and thirty per cent will gravitate into chronic insanity.

From the arrest of mental development or the dementia induced by scarlatina, we have but little to hope, as the results are most discouraging. The insanity resulting from variola is equally hopeless, even Régis admitting, in a paragraph following that above quoted, that "when insanity develops in the convalescent stage it *may* assume a chronic type."

The fact that post-febrile insanity is now less common than it was a generation or two ago may be accounted for in part, I believe, by the fact that the treatment of fevers is now supporting instead of depressing as it used to be.

In regard to the treatment, but little need be said. As perverted nutrition and anæmia have been referred to as causative factors, it is evident that easily digested food should be frequently administered and that the bitter tonics,

and also wine and iron, should be prescribed. Such drugs as opium may in some cases keep up the excitement and should therefore be given with care. As soon as possible the patient should be got into the open air for several hours a day in suitable weather, and when the strength begins to return light employment and recreation should be furnished.

PACHYMENINGITIS HEMORRHAGICA INTERNA IN THE INSANE.

By J. E. COURTNEY, M. D.,

First Assistant Physician, Hudson River State Hospital.

The frequency with which the condition of pachymeningitis interna pertains in the insane, about one autopsy in every 18 or 20 exhibiting the condition in some degree, suggests inquiry as to the symptoms and significance of this disease and whether it may not sometimes be primary instead of consecutive.

Generally speaking, the condition is found oftener in cases in which, from cerebral excitation, there occur repeated cerebral engorgements, or in which there exists most active meningo-cerebritis, e. g., general paresis, alcoholism and cerebral atrophy.

As to the pathology, one who sees many cases will soon adopt the view that it is hemorrhagic, inflammatory changes antedating the hemorrhage in most cases; that the membrane results in the first instance from hemorrhage from the veins of the congested, and frequently inflamed, dura or pia arachnoid.

The amount of hemorrhage and the character of the membrane vary greatly. There may be only a delicate rusty stain, or delicate adventitious layer easily wiped or peeled from the surface of the dura, or a little blood in a thin fibrous sac, to an organized tough membrane enclosing serum or partially clotted blood in quantity. Once sufficient hemorrhage occurs to make a confluent layer of

blood between the dura and pia arachnoid the membrane forms by a process of organization, absorption and attenuation and attains a feeble or fairly active circulation of its own. Two or three layers of such membrane having formed a sac, hemorrhage of great size may take place from and between its walls. It is not necessary to conceive the rupture of any particular vessel. Minute hemorrhages probably take place from a number of the most delicate peripheral vessels, while haematoma of the brain is much more frequently found in advanced cases of insanity; symptoms diagnostic of the state do occur early in the history of some cases, and in some at the beginning of the attack. There are also cases once or repeatedly presenting symptoms of grave cerebral injury which have proved surprisingly and unaccountably brief, and can only be explained on the theory of shock or pressure from a surface hemorrhage which became absorbed entirely, or left so thin a membrane as to no longer prove a source of compression or irritation. This explains the peculiar accession and recession of certain symptoms especially in cases not insane where the trouble was produced by traumatism. The following cases will illustrate the clinical phenomena presented in these cases:

CASE I.—C. D., aged 60. Admitted August 11, 1894. A few days before admission found wandering about the streets and lodged in jail for being "drunk and disorderly." Medical certificate states she had been "incoherent; loquacious, at times lachrymose, at times pleasant in manner." On admission, pulse 100, tongue coated, could not tell where her home had been nor give the name of any one interested in her. Emphatic in describing pain in head and wanted wet cloths applied.

August 12, 1894. Sits quietly in ward, very indifferent.

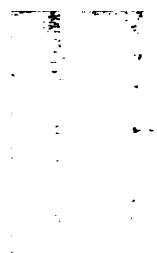
August 14, 1894. Has rubbed hair from both parietal eminences; often puts hands there; says head feels very badly.

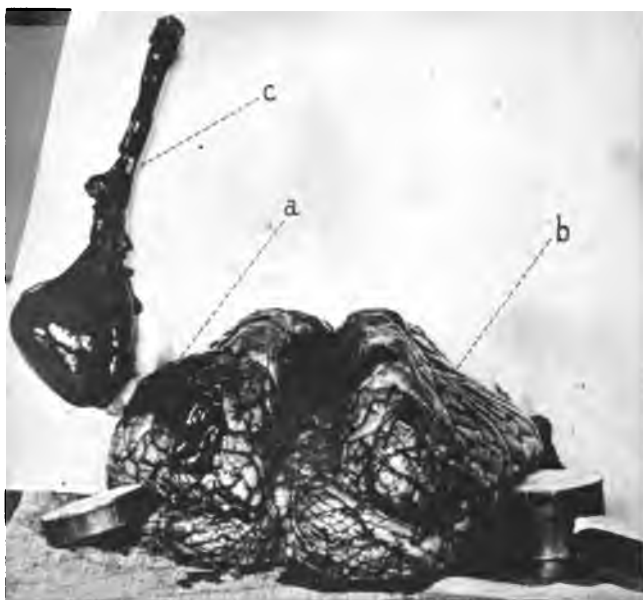
August 20, 1894. Restless and excited in night; tied string about neck as if to choke herself.

August 21, 1894. Noisy, resistive, attempts to fight her fellows.

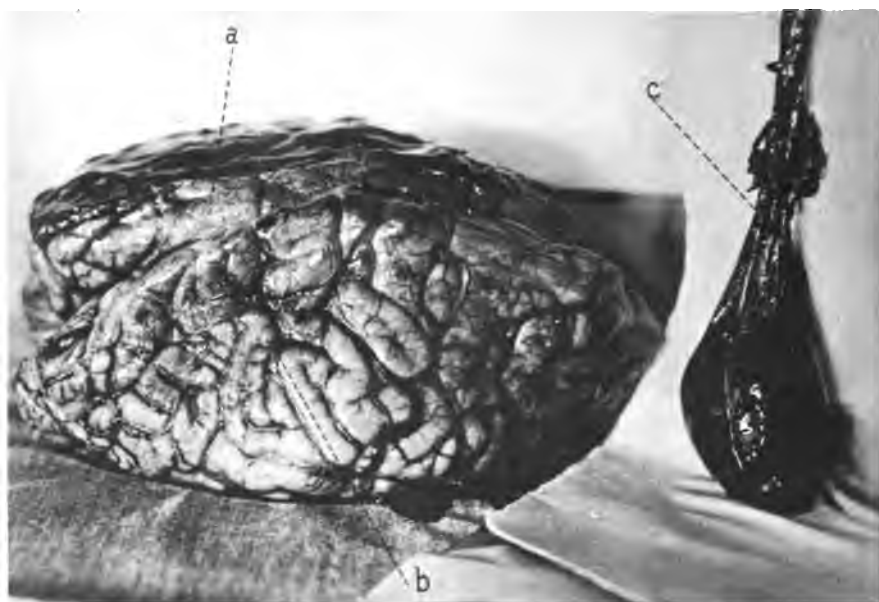
September and October. Confused and incoherent at times, very restless.

November 10, 1894. Fell in night; restless, throws covers off, fatuous, can't speak.





CASE I.—Fig. 2—*a*. Collapsed membrane of left hæmatoma in position.
b. Depression occupied by right hæmatoma.
c. Right hæmatoma membrane tied to prevent escape of contents.



CASE I.—Fig. 1—*a*. Collapsed membrane of left hæmatoma in position.
b. Depression occupied by right hæmatoma.
c. Right hæmatoma membrane tied to prevent escape of contents.

November 17, 1894. Mute, fatuous, almost comatose, dorsal decubitus, fed with spoon, bed sores threatening.

November 20, 1894. Coma has gradually deepened, pupils now contracted. Died 6 P. M.

Autopsy: Calvarium thin; when removed dura quite adherent and bulged over parietal regions and when removed showed large hæmatoma over each parietal region extending from frontal to occipital region, and containing over 3 oz. of partially clotted blood, the right being somewhat larger than the left.

There were deep depressions into the hemispheres to accommodate the hæmatoma; convolutions flattened. Walls of hæmatoma well organized so that right was removed entire. The left lost its contents when skull was opened but is left *in situ*.

See Figs. 1 and 2. Inner surface of dura and outer of pia integral, barring a few easily ruptured adhesions to the sac.

CASE II.—A. B. Admitted September 11, 1890, aged 64. Mind impaired for last five or six years, has had habit of wandering aimlessly about streets and overhauling things at home. Two years ago had right paralytic attack; was in bed a week then up and strong as before, but has not spoken since and has been deeply demented, wetting and soiling herself, eating anything she picked up. Certificate stated that "she wandered about, was restless, mumbled unintelligibly, moved hand and mouth aimlessly."

September 12, 1890. Expression of face vacant, wanders about ward and says "yes" to everything said to her.

December 10, 1890. Appears deaf, knows use of some articles, shakes hands and smiles, selects her name from several on slips of paper; asked to write her name, made "A" only; can now utter no sound.

March 21, 1891. Confined to bed, mute, wets, soils herself.

June 18, 1891. Deaf; no smell or taste, takes valerian, quinine and capsicum with equal indifference.

July 28, 1891. Slowly failed and died at 5.10 A. M.

Autopsy: Scalp anaemic, calvarium thick and dense; dura attached on each side Falx and when turned back presented pachymeningitis hemorrhagica interna, a delicate reddish brown adventitious layer which easily stripped in sheets from inner surface of dura; pia-arachnoid clearly showing inflammatory changes; vessels enlarged with dark blood; gelatinous effusion filling sulci; points of adhesion between pia and brain; cerebral atrophy.

CASE III.—G. R. Admitted May 26, 1895, aged 31. "Two years ago depressed, but brightened up; three months ago got worse, careless, stopped all her work and wandered about, loquacious and rambling in talk, expansive and disposed to praise everything." Certificate: "Depressed hears people talking about her; disconnected in

speech; husband says she throws away useful articles; talks a great deal and wanders off, not knowing where she is going."

May 29, 1891. Confused, loquacious, happy, ataxic in gait and speech, reflexes exaggerated.

June 1, 1891. Noisy, sings, swears, cries, very ataxic in gait, steadies herself against chairs.

June 6, 1891. Says there is a hole in her head, that it passes through her forehead, that it came last night; very tremulous in speech, unsteady in gait.

June 20, 1891. Describes severe headache; childish and happy.

August 3, 1891. Filthy in habits, exposes person.

February 16, 1892. More disturbed and very destructive.

March 16, 1892. Pupils unequal, right larger; patella reflex exaggerated, no ankle clonus; says her dresses are silk.

September 26, 1892. Convulsive seizures followed by partial loss of use of right side; can't articulate and can't understand what is said to her.

October 7, 1892. Recovered from paralysis of right side.

October 15, 1892. Up and about as usual.

November 7, 1892. Filthy, noisy, destructive, failing.

March 20, 1893. Fails, can't speak, shows no intelligence.

April 7, 1893. Lies with mouth open, bed sores formed

April 10, 1893. Died. Autopsy: Brown membranes adherent to surface of brain between dura and pia, an organized false membrane which peeled like a leaf from brain surface; vessels distended; fluid in brain; lateral ventricle distended with fluid.

CASE IV.—C. V. Admitted to Marshall Infirmary October 19, 1891, aged 33. "Person bringing her could learn no history, nothing known of her. Dull, stupid, made no replies to questions, slow and shuffling gait. Since admission has had several seizures of a convulsive character and few minutes duration, followed by increased hebetude and loss of physical power; untidy, violent, voracious appetite." For three months has not spoken a word. Admitted to H. R. S. Hospital, September 27, 1892. Does not speak but looks at objects as if with appreciation. Original certificate of commitment states that onset was a few months ago; depressed, could not tell her name nor where she was, talks incoherently and attempts to wander off.

October 13, 1892. So far silent except to utter an isolated word or two; yesterday had a right side convulsion, clonic spasm of whole side, right side partially paralyzed this a. m., no motion nor sensation.

October 14, 1892. Another slight convulsion.

October 16, 1892. Up to-day.

November 12, 1892. Up; rather helpless, and at times sinks to the floor.

December 10, 1892. Twitching of face and right arm, no unconsciousness.

February 6, 1893. Smiles, tries in vain to talk; remains in bed.

March 8, 1893. Right arm and leg weak and muscles of face drawn to right; gnashes teeth.

March 20, 1893. Failed and died this A. M.

Autopsy: Fluid in cranial cavity. Dura adherent to calvarium; vessels turgid; hemorrhagic exudation over surface of dura both chronic and recent.

CASE V.—F. J. J. Male, aged 31. A patient from N. Y. City. Was overworked for two years, became suddenly unconscious for one hour, loss of motion on both sides, lasting two hours. Since then (one year) muscular power on left side poor, jerking left arm and leg, tremor of tongue, memory poor, irritable, no expansive delusions, no hallucinations. Semi-comatose, chatters, twitches, unconscious two hours and died. Autopsy showed large hæmatoma of brain.

It will be seen that the symptoms of hæmatoma of the brain are partial hemiplegias (of transient character, compared to those of central, or even of more sharply defined cortical injury of brain), cortical irritation such as headaches, convulsive movements, contracted muscles, and jactitation. In more advanced states symptoms of irritation are superceded by those of pressure; there is a peculiar fatuity, aimlessness of movement, restlessness, contracted pupils, and stupor deepening into coma.

The treatment depends largely upon the management of the accompanying condition. The utility of trephining is an unsettled question.

A TRIAL OF THYROID IN A FEW CASES OF INSANITY.

BY ALES HRDLICKA, M. D.,

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There is no other class of disorders of the human organism where therapy would be so necessary and yet its means be so limited and uncertain, as that of insanities. Aside from the homeopathic form of medication, the whole armamentarium of remedies consists almost exclusively of a few tonics, hypnotics and narcotics. In such a state of affairs and at the period of general rapid advance in medicine, it becomes the duty of every alienist whom opportunity favors

to judiciously try whatever means or remedies there come that bear a promise of prevention, alleviation, or cure of mental aberration.

Among the many new remedies lately advanced and capable of influencing more directly the central nervous system, is the extract of thyroid. Used originally in myxœdema and allied pathological conditions, this remedy was found to augment the general process of oxidation, which tends in turn to accelerate all the physiological functions of the body; to exert a hematopoietic influence (Horsley); and possibly to have a still further, specific, action. G. W. Cray (Amer. Jour. of Med. Sciences, May, '94) found it to produce an elevation of temperature; increased appetite with more complete absorption of nitrogenous foods; loss of weight, due to increased metabolism; excretion of nitrogen in excess to that taken in food; growth of the skeleton in the very young; marked improvement in general nutrition; and, augmented activity of mucous membranes, skin and kidneys. Its want, on the other hand, as after extirpation of the gland, presents almost opposite manifestations, leading to a profound cachexia strumipriva, which ends in coma and convulsions (uremic-toxic, Rosenblat). Two observers, L. Haskovec and E. Formanek, both of Prague, who occupied themselves for a long time with the special study of thyroid and lately performed a long series of important experiments with the gland on animals (Dissertations of the Bohemian Academy of Arts and Sciences, No. 12, 95), found that:

(1) After extirpation of the thyroid there follows a systematic diminution of the numbers of the red blood-corpuscles and an increase of the leucocytes.

(2) The amount of solids of the blood, including the iron resp., the hæmoglobin, becomes subnormal.

(3) Granules of iron (liberated in the breaking up of the erythrocytes) is being deposited, in the form of minute granules, in various organs, especially in the spleen and the lymph-nodules.

(4) The diminution of hæmoglobin causes increased com-

pensatory respiration and heart's action, and is one of the main causes of the cachexia.

(5) The thus disordered blood, with other not yet demonstrated agencies, gives rise to toxic substances in the system. * * All of which effects are removed by injections or some other efficient means of administration of the extract of other thyroids. * * Similar deductions have been reached by Horsley, Schiff and others.

In therapy, the effects correspond closely with those of experimentation. The symptoms noted by various observers during administration of the thyroid, particularly its extract, were increase of pulse and respiration; general physical improvement; increase of secretions, and improved cerebration. Large or long continued doses induced headaches, nervousness, tremors, fatigue, digestive disorders, nausea, aversion to the remedy, diffuse pains and loss of weight. Among some unusual symptoms Rogers reported intermittent uterine pains; Ohl, backache and stiffness in limbs. Finally, death by syncope was noticed several times in England, France and Germany.

As to the true active substance of thyroid, we know practically nothing. There have been already more than four years of assiduous and wide attention given to the remedy, and I could cite pages on its effects from both American and foreign authors, but what principle it is that produces all this lies still secluded. Poehl, of St. Petersburg, found spermine in the extract, and it may be that to this principle thyroid owes in part its action; this probability is augmented by the fact that thyroid exerts a decided, but still obscure, influence over the generative system.

It is but natural to deduce from the foregoing that this new agent ought to favorably affect at least some forms of insanities. We should hardly expect any marked results from it in genuine maniacal states, where there is already enough exaggeration of almost all the normal processes, but there is a whole field of melancholias where every function is retarded, circulation, respiration, secretion and excretion deficient, metabolism perverted and nutrition always

below normal; and again some sub-acute manias, katatonia, hysterical, epileptic, neurasthenic and toxic insanities, in all of which either the nutrition is profoundly altered or there are substances present or being generated in the system that constantly tend to disturb its equilibrium and bring it below normal; and, lastly, some "reflex" insanities and incipient stages of mental weakening in both children and aged—and in all these thyroidine, from even the little we know of it, would find at least some indications.

It was these considerations that led me, with the permission of Dr. Talcott, the Superintendent, and Drs. Allen and Kinney, his assistants, to try the remedy in twelve cases of insanity that are to form the basis of this paper. I gladly acknowledge I have not been the first in such an attempt, though I only learned this long after its contemplation. Within the last eighteen months the treatment has been tried quite extensively by Bruce in England, Clarke of Kingston, Ont., several French and German observers, and more recently by Dr. W. L. Babcock of the St. Lawrence State Hospital. I will not dilate on these works, as the object of my paper can not be an extensive comparative study but a simple report.

The cases I chose were all of rather a grave kind; it is easier to ascertain an effect in these than in the acute cases that constantly present variations, besides there being involved much less responsibility, which gives more freedom in the trial.

I chose four general paretics, males, all well along in the stage of the primary physical symptoms, and all, as far as could be ascertained, without syphilitic history; and eight females, of which one (I) was profound, suicidal melancholia with stupor, of several months' duration, in a girl of 22; one (II) of primary dementia of uncertain duration in a girl of 15; one (III) of an apparent dementia following acute melancholia of seven months' duration, in a woman of 39; one (IV) case of puerperal insanity, second attack, with depression, confusion and sexual delusions, of 27 months' duration,

in a woman of 35; one (V) case of paranoia with hypochondriasis and delusions of persecution, of eight years' duration, in a single woman of 34; and three cases (VI, VII, VIII) of secondary dementia, each of about one year's duration, following respectively circular insanity, acute melancholia and melancholia after multiple neuritis, the first in a fallen girl of 32, second in a girl of 24, and last in a woman 43 years of age.

All these patients were free from any organic respiratory or circulatory disorder. Three of the men and five of the women were bed-ridden.

The patients of each sex were placed together and under special supervision of reliable trained nurses. All other medication was stopped, but nothing was changed in the ordinary mode of life of each individual. The best possible hygiene was secured, and two of the female patients, who suffered from vesical catarrh and leucorrhœa respectively, had administered occasional simple irrigations.

Temperature, pulse and respiration were recorded daily, at first every six hours, later twice a day, and, further, everything was recorded of both physiological and pathological manifestations. I saw the patients at least once a day and examined them physically at first every day, later at longer intervals, as seemed necessary. Once every week the urine was collected and analysed.

The time of treatment extended over two months, from July to September. A two weeks' interval was made after the first month, to allow time for elimination of the remedy, should it be cumulative, and to refresh the patients for its repeated action.

The preparation used, on recommendation of Dr. Starr, was Fairchild's five grain thyroid tablets. The administration began with one, and augmented gradually to four, five and even six (in the case of one patient) tablets daily. The time chosen was between the meals and at bedtime. Once every week also the weight of each patient was taken, the same scales being used at every weighing.

Under such regulations, changes were noted as follows:

Pulse: respiration; temperature.—Both pulse and respi-

ration increased in number during the administration of the thyroid. This increase commenced immediately after the beginning of the treatment and lasted throughout, becoming null during the pause; but it was not proportionate to the dosage. It was never extensive. The highest pulse recorded was 120, the most frequent respiration 30; but those were exceptional. The common increase in heart beats ranged from ten to thirty, that of respiration from two to four. The pulse in almost all the cases was noticed to have become fuller; it was never irregular, nor was any cardiac oppression or dyspnoea complained of.

The increase in temperature was mainly noticed at about 3 P. M.; it varied generally from one to two degrees, the highest temperatures reached having been 102.5 F. (cases f. II, m. I, IV).

Two of the women (III, IV) presented practically no changes in the above respects, especially the first, and one (VI), who received as high as thirty grains of thyroïdine daily for several successive days, never surpassed temperature of 99, pulse 90 and respiration 22. The men, paretics, were found to be much more susceptible to the remedy, any increase in dose being in them promptly followed by augmentation in all these processes.

Skin.—During the treatment the skin of all the patients was moist and healthy; no eruptions; in one case (I), affected with hyperidrosis, this diminished. Nails and hair appeared healthier.

Appetite.—The appetite generally improved, though in different degrees. No digestive disturbances were noticed, except in female patient No. II. In this case, at the end of the third week of treatment in the second month, when taking four doses or 20 grains of thyroïdine daily, the tongue became gradually coated dirty yellow, sordes developed, the breath became offensive and food would not be taken, so that the patient had to be fed by means of a nasal tube. The general condition simulated almost a typhoid.

Bowels.—A remarkable salutary effect was noticed here:

in all my cases the remedy tended to a looseness of the bowels. Constipation has been promptly relieved and regular action established; several times diarrhoea has been produced, but it yielded rapidly to a diminution of the remedy, or to a few doses of some ordinary medicine. This good effect was so general and lasting that it would deserve further attention.

Urine.—The effects of the remedy on urinary secretion are hardly less remarkable and important. I regret not having had at my command the means for a thorough analysis and hence not being able to particularize these changes; but, as far as I could test, I found in the female patients invariably a more unpleasant odor to the urine, more mucus, and increase of urea. The quantity, as far as could be ascertained, varied very little, if any. I append here a table showing the changes in the specific gravities. In the paretics, strange to say, the changes were but very few.

WOMEN.

Week:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Case 1	1013	1023	1029	1035	1018	1028	1020	1030
" 2	1020	1030	1022	1022	1018	1025	1024	1028
" 3	1019	1016	1023	1018	1018	1023	1022	1020
" 4	1022	1026	1020	1022	1018	1020	1018	1022
" 5	1021	1027	1017	1026	1030	1027	1026	1030
" 6	1019	1019	1012	1021	1022	1022	1022	1022
" 7	1012	1009	1010	1010	1010	1016	1015	1020
" 8	1025	1022	1024	1028	1030	1023	1024	1030

MEN.

Case 1	1018	1011	1018	1003	1013	1014	1015	1014
" 2	1024	1023	1022	1025	1026	1020	1027	1024
" 3	1013	1013	1017	1006	1010	1017	1015	1013
" 4	1026	1019	1013	1017	1020	1024	1017	1020

Menstruation was not perceptibly affected; nor was the thyroid gland itself.

As regards the weight, most of the patients lost during the treatment; four, or one-third, gained markedly. The greatest loss has been seventeen pounds, the greatest gain eighteen. The patients ranged as follows:

WOMEN.

	At Start.		First Week.		At End.
Case 1	105 pounds.		105 pounds.		107 pounds.
" 2	103 "		106 "		97 "
" 3	99 "		104 "		108 "
" 4	123 "		120 "		116 "
" 5	78 "		83 "		80 "
" 6	85 "		94 "		96 "
" 7	123 "		115 "		106 "
" 8	100 "		111 "		106 "

MEN.

Case 1	136 "		136 "		134 "
" 2	122 "		122 "		140 "
" 3	104 "		106 "		108 "
" 4	161 "		160 "		150 "

Mental symptoms:—All the mental symptoms noticed may be arranged under two headings: as long as the quantity of thyroid in each individual case remained moderate, there were signs of more or less pronounced general psychological improvement. The patient's mind became clearer, more active, and the manner livelier. Sleep was improved. When the dose surpassed the moderate mark, as a rule, symptoms of irritation appeared. The patient would sleep less, become moody, excitable or noisy. In the girl dement (II) such an excitation culminated in a prolonged stage of mania. Another case (f. V), whenever the dose was pushed higher, would become excited, abusive and destructive, returning to normal only after the dose was considerably diminished.

Special symptoms:—Aside from those noted already there developed in one of my paretics (I) a monoplegia of the left arm. It occurred at night, without any prodroma, and lasted about a week, disappearing gradually without any special treatment.

The entire amount of thyroid administered varied from 90 doses or 450 grains in the paretics to 120 doses or 600 grains in the female patients. Case IV, female, received but 80 doses; Case VI, female, 130 doses.

Final result.—The case of puerperal insanity, No. IV, recovered and was sent home. Cases (female) VIII, III,

VI and I improved temporarily; case II grew worse. In the paretics but few temporary ameliorations were noticed.

Conclusions.—The trial being finished, I stay convinced of the utility of thyroid in insanities; but I would look upon this agent more as an *alterative* of great value than as a curative drug, and as such would use it not only in all the states theory would indicate but, as was stated before, especially in those cases that stand at the dividing line between acute and chronic insanity or between this and dementia, where the body seems to have overcome the disturbance, but with the brain still impaired. This I deduce not from the result of these cases, which is in no way striking, but from their observation. Large doses of the remedy seem to be useless, if not harmful. Its effects in paresis are null—unless they may differ in its very beginning.

More conclusions would be useless or, from the small number of cases, unwarranted, and consequently I terminate my report, thanking once more those who enabled me to test the remedy, and regretting that present personal circumstances hinder me from continuing the experiments.

TYPHOID FEVER.

REPORTED BY P. M. WISE, M. D.,
Superintendent, St. Lawrence State Hospital.

The history of typhoid fever in the St. Lawrence State Hospital is instructive in illustrating an infection that may elude the ordinary means of bacteriological research, and yet be sufficient to keep a small percentage of the population of a community quite constantly under its influence.

The water used for all purposes at this hospital is taken from the St. Lawrence River. The hospital is situated about three miles below the outlet of sewage from the city of Ogdensburg, but this city has been free from typhoid, with one exception, within the period of this history.*

* A well became infected and the users of its water suffered from typhoid to the extent of twelve persons. The closing of the well stopped the endemic.

Ogdensburg takes its water supply from the Oswegatchie River, and there is no well authenticated case of infection from it. The nearest town above Ogdensburg discharging sewage in to the St. Lawrence River is Brockville.* This village has a comparatively large mortality from typhoid fever.

The water supply for the hospital is taken through an intake pipe that has its mouth in eighteen feet of water, in a current of five miles an hour. The water gravitates into a covered well, passes through a partition of small wire screen into another division of the well from where the suction is taken from the pump, and it is distributed throughout the hospital system by direct pressure. Until the last year, the fever has been confined to the winter months. When the ice forms in the river marks the beginning of the disease and it continues until the clearing of the river from ice. The only plausible theory that has been offered has been that the ice, which forms thickly along the shore line, forces the shoal water down towards the mouth of the intake pipe; but this theory rests upon another, that the infection is confined to the shoal water. During the past year cases of typhoid have occurred in every month, the only change in condition being a very low water mark in the river—lower than has been known for many years previously.

A predilection for sane persons has also been a manifestation that cannot be explained. It is certainly more than coincidence, as it is a constant manifestation. The hospital opened in December, 1890. To the present time there have been 48 cases of typhoid recognized. The ratio of patients to employees has been quite constantly four to one, yet of the 48 cases, 25 have been employees and 23 have been insane. The same water has been used throughout the hospital. There are but two cases in which a doubt exists regarding the infection being received at some other place. Mental alienation would therefore seem to give partial immunity.

*Brockville is a village of 6,000 inhabitants, situated 15 miles above the hospital.

In regard to the source of the pathogenetic poison that produces this disease, I believe there cannot be any controversy at the present day. In the instance here set forth, the fact that the disease has been so largely manifested at a period of the year when frost, snow and ice would prevent soil emanations, is sufficient to exclude the Pettenkoffer theory. Another satisfactory test occurred during the last season: when typhoid was giving indications of becoming endemic, the water used for drinking purposes throughout the hospital was sterilized by boiling, and of the several cases that have occurred since, it was shown that unsterilized water was drunk.

Among our experiences is one that seems to show the carrying of the pathogenic infection by air. During the months of April and May, 1894, there were four consecutive cases developed in persons engaged in the same ward dining room; of these, three were employees and one was insane. They were, at that period, the only cases in the hospital, and the apparent coincidence excited no little wonderment and conjecture. No cause could be assigned, as the ward was newly opened and the same conditions seemed to exist there as elsewhere—the food and drink being absolutely the same as that used in other wards, in fact being taken from the same vessels. It was found, however, that in a conduit opening directly underneath this dining room, which connected with the boiler house six hundred feet distant, and which carried the steam pipes for heating, etc., there was a strong current of air towards the dining room; that this air was loaded with moisture to a degree that it would condense upon the walls and run in streams to the floor. There was also found near the boiler house opening of this conduit, a small area that had been neglected and was partially filled with ashes and debris. About eight months previously a case of typhoid had developed in a fireman, and he had continued at his duties until the tenth day of the disease. He confessed that during this period he had used this area in which to defecate. Air passing into the conduit would

in great part pass over this matter and as it was humid from leakages of steam and a heated atmosphere would carry particles of fine matter, as was shown by the walls and ceilings of the dining room. With the cleaning and disinfection of the infected area, and the diversion of the current from the conduit, no further cases developed. If the presumption is correct, that the infection in these four cases was carried as indicated, they might properly be deducted from the total of those chargeable to drinking water.

The "type" of the disease that has governed here has not been unusual, except in two particulars. Constipation has been the rule. In some instances obstipation has been troublesome and even serious. The fatal cases have, without exception, been marked by diarrhoea from the first. A slight bronchitis has characterized the onset of nearly all the cases, and in many instances the cough has been a troublesome symptom after convalescence.

The following case is an illustration of recovery from insanity following typhoid fever, that had previously passed through a severe attack of facial erysipelas without any change.

CASE No. 549. Admitted Jan. 16, 1892. A male, 41 years old, married, nativity of self and parents, New York, farmer, academic education, uses tobacco excessively and liquor moderately, no heredity known. Physical condition on admission was fair, pulse 84, temperature normal, tongue clean, appetite good, chest organs healthy. First attack of insanity and first admission to a hospital. Duration of present attack said to have been eight days. Classification, sub-acute melancholia. Alleged cause, family quarrels and property troubles. Has suffered from no bodily disease recently. His apprehensions are very great, and he fears persecution from relatives and political foes. His depression is quite marked. About the middle of April, 1892, there was a slight reaction to cheerfulness and vivacity, but it was of a few days' duration, when he relapsed into his former state. No material change in his mental condition, and bodily nutrition continued good until Nov. 7, 1892, when he had a chill which marked the onset of a sharp attack of facial erysipelas. His temperature at this time reached a maximum of 104 degrees. Desquamation began upon Nov. 13, after quite a severe period of constitutional disturbance. *There was no mental change following the recovery from erysipelas.* His depression was fully as great as before, and nutrition returned to the former standard.

Upon January 9, 1893, the patient presented signs of typhoid fever. He passed through a severe period 63 days in length, during which there was a complication of suppuration of the middle ear, and a relapse following defervescence. The fastigium appeared about the fourteenth day. The attack was prolonged and severe. Maximum temperature 105.4. Some delirium. By carelessness of the nurse, was permitted to eat a hearty meal of solid food on the twenty-second day of the disease, without any untoward results or rise in temperature. Upon Feb. 20th, convalescence was declared, and there was a very marked change in his mental condition, as compared with that previous to his attack. He was cheerful and mentioned his former delusions of which he appeared entirely free. Visited by his wife, who said that he appeared entirely well, and he was discharged as recovered. For three years (to the present time) has remained in usual good health.

The following case of recurrent mania, with a history of not less than three previous attacks, in which anti-syphilitic remedies were used during convalescence from typhoid fever, presents some unusual features:

CASE No. 1091. Female, aged 45, married, one child living, native-born, heredity unascertained, was admitted Aug. 5, '93. At the date of admission the duration of attack was unknown, but she was known to have been in a maniacal condition for one week previous. She was well-nourished, (weight 121) pulse 48, pupils dilated, bowels obstipated, tongue moist and clean, but with denuded edges, temperature normal, speech incoherent—garrulous.

Oct. 7. Continues exhilarated and irascible, but excitement is reduced. Weight 133. Placed on mixed treatment.

Nov. 8. No mental improvement. Weight 147. Pot. Iod. increased to 3 ss, with Hydrarg. Bichlor, gr. 1-48, t.i.d.

Nov. 17. Provisional diagnosis of typhoid with an evening temperature of 103.4. The following chart gives the temperature curve and pulse rate for 48 days, when convalescence was declared.

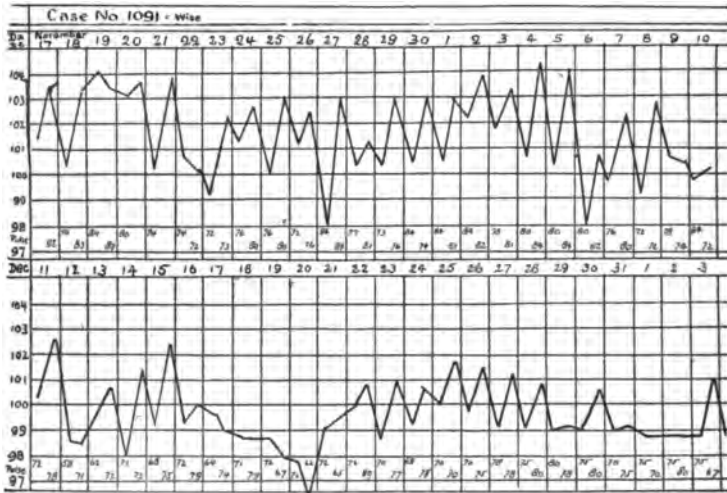
Feb. 27. Convalescence was prolonged. Has been gaining rapidly in weight, (157½ lbs.) Mental condition dull. Mixed treatment since Jan. 19. Has recently shown some dropsical symptoms.

Feb. 28. Urinary examination negative, except a trace of sugar. Mixed treatment discontinued.

March 15. Improvement has been progressive. Is in normal mental condition. Discharged recovered.

It is doubtful whether the above recovery can be ascribed to the typhoid, although the three months' previous treatment had not resulted in any marked improvement. The case was an acute one, and recovery might have been

expected in any event. The case, however, was one of recurrent mania, with a period between attacks of approximately one year. To the present time nearly three years have elapsed without a recurrence, and it is possible that the insanity habit may have been checked, if not obliterated, by this incident in the patient's physical history.



The following case is that of an epileptic, subject to frequent convulsions, with a fairly regular interval, in which the convulsions were wholly suspended during the typhoid period, and far into convalescence, but began again and have continued since with usual violence and frequency. No mental change.

CASE No. 571. Female, aged 26, admitted Feb. 17, '92, in a condition of post-epileptic dementia. Patient was feeble upon admission and was placed in bed. Her convulsions are frequent and occur in greater part at night. Record of convulsions show at least one daily, and sometimes as many as four. Is not subject to the *ep. status*. On Feb. 29, '92, she had a sharp attack of bronchitis, covering a period of two weeks, during which the evening temperature ranged from 101° F. to 103° F.; upon one occasion reaching 104.8° F. Throughout this period from the onset of pyrexia, until convalescence was established, convulsions were wholly suspended.

Mar. 6, '95, diagnosis of typhoid was established, and the fever ran

a short and uneventful period. Defervescence commenced upon the 15th day, and subsidence was reached in four days. From Feb. 10 to April 2 (a period of 51 days) convulsions were entirely suspended. From Mar. 18, temperature had remained at normal. When convulsions began again, the period was lengthened, as follows: 1 convulsion on Apr. 2; 1 on Apr. 7; 1 on Apr. 11; 1 on Apr. 18; 2 on Apr. 27. From this time forward the period progressively grew shorter, until the usual epileptic condition had been established. There was no change in the mental condition. There were no cerebral symptoms from typhoid.

As opposed to the case above cited, there are the histories of three epileptics, in which there was no modification of the epileptic state during the typhoid period, either in the frequency or severity of the fits.

The following case is noted for the persistence of hallucinations, and delusions:

W. J., male, fireman, aged 26, single, of nervous temperament and spare physique, consulted a physician of the hospital staff on Oct. 1, 1893, when typhoid was recognized, the disease being at that time at the ninth day. Was immediately placed under favorable conditions for treatment and assigned a nurse. A prominent symptom is an "apprehension of impending evil." Throughout the course of the fever and during a prolonged convalescence, there was a "nervousness" and a loss of psychic inhibition, that placed him on the borderland of insanity.

Oct. 10. Temperature, A. M. 101.6° F.; P. M. 102° F. Delirium frequent. When not delirious has persistent hallucinations of quarrelsome people underneath his bed, wrangling. Oct. 13, Temperature A. M. 100.2° F.; P. M. 102° F. Delusions continue. Believes to-day that people are walking about in the cellar watching him. Says he cannot take any more food, as he cannot get rid of it. Has had no delirium for past two days. Very apprehensive. Muscular tremor of facial muscles. Oct. 21. Temperature A. M. 101° F.; P. M. 102.2° F. Delusions continue, and milk was stopped on account of them. No delirium. After convalescence was well established patient had occasional hallucinations of hearing, and there was a constant tendency to base delusions upon them. Made finally a good recovery although convalescence was prolonged.

The mortality was unusually large, there being thirteen deaths in a total of forty-eight cases, or twenty-seven per cent. Of these, six deaths were employees, out of twenty-five cases, or twenty-four per cent, and seven deaths in patients out of a total of twenty-three cases, or thirty per

cent. In the case of employees, four deaths were due to perforation, one to pulmonary tuberculosis developing as a sequela, and one to excessive hemorrhage. Of the deaths of patients, four were due to exhaustion, and in these cases the subjects were debilitated and unable to resist the exhausting process of the fever; one was a general paralytic in the third stage dying in an intestinal crisis upon the seventh day; one died from peritonitis and nephritis supervening, and one from acute pleurisy as a complication.

In the month of July, 1895, the State Board of Health was asked to give the matter of typhoid at the hospital their attention, and the question was submitted to Dr. F. C. Curtis, of Albany, N. Y. He devoted several days to the examination of all the conditions at the hospital, to the location of cases and their history, and made a voluminous report* upon the subject. His report is such an excellent one and covers the ground so thoroughly, that excerpts from it will prove a fitting conclusion to this report. Since Dr. Curtis' examination, three more cases have occurred, which I have added to his tabulated report.

"This institution is situated upon the banks of the St. Lawrence River, three miles below Ogdensburg, on a broad point, around which the river makes a curve of half a circle. The banks here and throughout this vicinity are abrupt but low, and the topography level; the extensive grounds, which are slightly rolling, probably nowhere having an elevation so great as fifty feet above the water. The buildings consist of three groups of connected one- and two-story structures, alternately of dark granite and Potsdam sandstone, known as the central hospital group, group number one and group number three, the first having a more pretentious central edifice, in which are the administration offices and rooms for the residence of officers, the whole group having a semi-circular frontage of more than one-third of a mile. The other groups are smaller. All are well away from the river. They are of the most substantial construction throughout, and, being recently built, are as perfect as possible in modern sanitary details. There are other buildings for the residence of the superintendent, steward, for nurses, etc. * * * The site is well drained and has not—prior to this—been occupied by residential structures. Surrounding it is but a sparse population.

" * * * The population of the institution now numbers about 1,600, of whom one-fourth are employees, and three-fourths insane people.

* Report upon the Prevalence of Typhoid Fever at the St. Lawrence State Hospital, by Dr. F. C. Curtis.

The latter are of all varieties of insanity, the hospital receiving all the insane from a defined territory which includes the northern counties of the State.

"The institution is supplied with water pumped for it separately from the St. Lawrence River at this point; its milk supply is from its own dairy, and the vegetable and farm products are raised on its own grounds

* * * * *

"In February, 1891, two months after occupancy began, the first case of typhoid fever made its appearance; the second one developed in May. There were no more until February, 1892, during which year five cases occurred. In 1893 there were seven cases, three in the winter and four in the fall months. In 1894, commencing in March, there were ten cases, most of them in the fall months. This fall prevalence continued into 1895, during the winter or more especially the spring months; up to April fifteen cases occurring, and six more following in the summer. There have been since the first, forty-five cases,* of which two came in 1891; five in 1892; seven in 1893; ten in 1894 and twenty-one (24) during the present year. At the present time there are no cases. Of the forty-five cases, twenty-two were patients, and twenty-three were employees† about the institution, less than half the sick being insane, although they constitute three-fourths of the population. If the exposure was the same this would lend evidence to the observation that the insane are less susceptible to infectious diseases. A few (2) were temporarily or permanently cured of their insanity. There were fourteen deaths,‡ of which eight, or more than half were among patients, and six were employees. The attendants all live in the buildings, and differ from the patients only in having more liberty to go outside; the patients had all been a sufficient time in the hospital to take their infection there, and this was generally true of the others.

"As to the character of the fever, there can be no question. Several autopsies were made which verified the diagnosis. The sick were generally treated in the hospital wards connected with each group. The excreta were disinfected with 1-2000 solution of bi-chloride of mercury and thrown into the water-closet.

"As to the location of the cases, the first seventeen occurred in the central group and group number one, except a painter and a fireman who lived in other buildings. As already stated portions of these buildings were constructed and occupied a year or two earlier than the rest of the hospital. There was no sequence of occurrence in any one place. There were but six cases in group three and three of these were attendants. By means of the following table the sequence, locality, etc., of the entire series of cases is shown."

* Three additional cases since Dr. Curtis' report was made. P. M. W.

† Corrected to the present time, 23 patients and 25 employees. P. M. W.

‡ This appears to be an error as there were but 13 deaths. The correction is made in the table.

No.	Date of sickness.	Patient or employee.	Building occupied.	Recov- ery or death.	Other data.
1.	Feb., '91.	Attendant.	Group 1.	D.	Died of tuberculosis.
2.	May 18-June 18, '91.	Patient.	" "	R.	Pneumonia, 4th week.
3.	Feb. 10-Mar. 10, '92.	Laundress.	Central group.	D.	Perforation.
4.	Feb. 25-April 4, '92.	Painter.	Outside building.	R.	Away for several days before onset.
5.	Mar. 14-25, '92.	Attendant.	Central group.	R.	Mild.
6.	May 2-June 9, '92.	Patient.	Central group.	R.	Frequent epistaxis.
7.	Aug. 13-Sept. 13, '92.	Patient.	Group 1.	R.	Pregnant.
8.	Jan. 9-Feb. 19, '93.	Patient.	Central group.	R.	Recovered from insanity.
9.	Feb. 24-April 6, '93.	Attendant.	Central group.	R.	Epistaxis, delirium.
10.	April 13-25, '93.	Attendant.	Central group.	D.	Perforation.
11.	Sept. 8-30, '93.	Patient.	Central group.	R.	
12.	Oct. 1-Nov. 28, '93.	Fireman.	Outside building.	R.	Treated in wards.
13.	Oct. 28-Nov. 28, '93.	Patient.	Central group.	R.	
14.	Nov. 17-Jan. 11, '93.	Patient.	Central group.	R.	Recovered from insanity.
15.	Mar. 2-April 20, '94.	Patient.	Group 1.	R.	Constipation marked.
16.	April 11-16.	Patient.	Central group.	D.	General paralysis.
17.	July 12-Aug. 8, '94.	Patient.	Central group.	R.	
18.	Aug. 28-Sept. 3, '94.	Attendant.	Group 3.	R.	Possibly infected from Ogdensburg well.
19.	Sept. 11-Oct. '16, '94.	Laundress.	Central group.	R.	
20.	Sept. 19-Oct. 15, '94.	Attendant.	Central group.	D.	Malarial symptoms, severe hemorrhage.
21.	Sept. 23-Oct. 30, '94.	Attendant.	Group 3.	R.	Malarial symptoms.
22.	Oct. 1-Dec. 1, '94.	Patient.	Central group.	D.	Acute pleurisy.
23.	Oct. 9-Nov. 13, '94.	Patient.	Central group.	D.	Autopsy shows typhoid lesions.
24.	Oct. 28-Dec. 10, '94.	Carpenter's wife.	Outside building.	R.	House has general supply.

No.	Date of sickness.	Patient or employee.	Building occupied.	Recovery or death.	Other data.
25.	Jan. 9-Feb. 5, '95.	Attendant.	Central group.	R.	
26.	Feb. 9-April 5, '95.	Attendant.	Central group.	R.	Works at Group 3.
27.	Mar. 3-April 20, '95.	Patient.	Central group.	R.	Temp. reached 105.
28.	Mar. 5-April 20, '95.	Attendant.	Central group.	R.	In hospital three weeks.
29.	Mar. 9-April 5, '95.	Attendant.	Central group.	R.	Long resident.
30.	Mar. 6-April 25, '95.	Patient.	Group 1.	R.	Epilepsy suspended.
31.	Mar. 13-April 17, '95.	Attendant.	Central group.	R.	Morning temp. highest.
32.	Mar. 13-April 9, '95.	Attendant.	Central group.	R.	Lives in ward.
33.	Mar. 16-April 5, '95.	Patient.	Central group.	D.	Autopsy, characteristic lesion.
34.	Mar. 17-April 4, '95.	Attendant.	Group 1.	R.	Strict Brand treatment.
35.	April 6-28, '95.	Patient.	Central group.	R.	No effect on acute mania.
36.	April 8-19, '95.	Patient.	Central group.	D.	Autopsy, marked typhoid lesions.
37.	April 9-16, '95.	Patient.	Central group.	D.	General paralysis, crisis.
38.	April 10-May 6, '95.	Waitress.	Central group.	R.	Infection from Case 12.
39.	April 14-May 11, '95.	Attendant.	Central group.	R.	Infection from Case 12.
40.	June 22-July 8, '95.	Patient.	Central group.	D.	Very high temperature.
41.	June 26-Aug. 15, '95.	Patient.	Central group.	R.	Temp. 105, mental symptoms improved.
42.	Aug. 1-Sept. 9, '95.	Patient.	Central group.	D.	Relapse, peritonitis, nephritis.
43.	Aug. 4-24, '95.	Attendant.	Central group.	R.	
44.	Aug. 8-23, '95.	Patient.	Group 3.	R.	Mild case, chronic mania.
45.	Aug. 9-15, '95.	Patient.	Group 3.	D.	Temp. high, exhaustion.
46.	Aug. 24-Sept. 28, '95.	Attendant.	Central group.	R.	
47.	Oct. 10-Nov. 30, '95.	Patient.	Group 3.	R.	Hemorrhages.
48.	Oct. 26-Nov. 30, '95.	Attendant.	Central group.	R.	Severe hemorrhages and epistaxis.

"The characteristics of this endemic are exhibited by this table. It is seen that soon after the hospital opened it began, only two cases occurring during the first year; that they become more numerous with succeeding years and increase in the population, having been especially and excessively so during this current year. * * * Whatever the cause, it is not one of transient and extraordinary character, but persistent and constant. * * * We have an endemic showing uniformity of distribution and throughout the period of its existence."

* * * * *

"I would report that it is my opinion the water supply is the source of of the endemic: (1) Because the other common sources for the development and spread of typhoid fever may all be excluded; (2) Because the characteristics of the endemic are those of such a constantly acting cause; (3) Because in the vast majority of cases, the epidemic or endemic prevalence of typhoid fever is due to a contaminated water supply. In the present case we have a navigated and sewage bearing stream used as the source of supply. The volume of the stream is so great that the pollution is almost inappreciable either to the unaided eye or to bacteriological test. But we know that the typhoid germ is a particular body, and while the number may be so comparatively infinitesimal in the volume of its carrier that it cannot be detected by the chemist, it is still capable of showing its presence and vitality by the clinical test if, being present even in minute quantity, it reaches a susceptible intestinal tract. This river is open to the possibility of specific infection from the shipping and from the sewage entering it above this point. There is only general rumor as to the probability of the former being a contributory source of this infection; as to the latter, we know that specifically infected sewage enters the river above.

(Dr. Curtis gives the history of typhoid fever of towns situated upon the St. Lawrence river and lake Ontario, for 100 miles above the hospital, for a period covering the history of the present endemic.)

"I do not think we are sufficiently familiar with the habits of the typhoid germs under varying conditions, and especially regarding its vitality in running streams, to determine whether they can be operative from such a distance. But I think we are quite as likely to obtain data by clinical observations as by any other means, and these are given for what they may eventually be proven to be worth. The elimination of other causes and the characteristics of the endemics, appear to me to show that the source of the contagion is the water supply.

"As to the remedy, Dr. P. M. Wise, the Superintendent, has from the first regarded the water supply with suspicion, and has attempted to remedy it, first by extending the intake further into the stream, and, later, by sterilizing the water by heat, and a measure of success

has seemed to follow. The latter is, however, impossible to secure absolutely, but it is the only present remedy.

"Good results have been of recent years secured with such waters from large, open filter beds, and would undoubtedly be here, although the lack of a sufficiently elevated site for them would probably present a difficulty. To abandon a source of water supply as abundant, accessible and attractive in appearance as this is, seems hard to recommend, but unless it can be sterilized its continued use cannot be recommended."

NOTE—During the period in the foregoing history, when the pathogenetic infection appeared to be at its height, samples of water were taken (1) from the main supply pipes (2) from melted ice and (3) from the outside of Chamberland filter tubes, for bacteriological examination. This was made by Dr. W. H. May of Syracuse. He reports: "I find no bacilli of typhoid in either of these samples. The organisms found are ordinary saprophytes commonly occurring in air, water, and upper layers of soil. They were present in very large numbers but no especial significance is attached to this, as they may have developed very much between drawing of water and delivery. The melted ice had least, sample number one next, and sample three the greatest number."

THE BLOOD'S INFLUENCE *PER SE* AS A CAUSATIVE FACTOR IN INSANITY.

BY ELBERT M. SOMERS, M. D.,
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A very ancient belief dating back even to the time of Hippocrates and his pupils concerning the blood's influence upon mental alienation has at the present age become a common and almost forgotten fact in the every day treatment of the insane.

Their belief, viz.: that "black bile" was carried by the agency of the blood to the brain and thus caused insanity in its varied phases. Translated into the language of to-day, this theory would in substance cover the many theories which are published in books upon psychiatry, which are based upon the result of careful and elaborate experiments by the use of technical instruments, exhaustive analyses and persistent painstaking physical and mental diagnosis.

It is strange that so early in medicine they hit upon so good an excuse (or cause) for what are now considered etiological factors and expressed by auto-intoxication, tox-

æmia, over-stimulation in its many forms, "inhibition theory" and morbid heredity; the latter theory, of course, figuring as a prominent predisposing complement.

The statistics are numerous to show with definite certainty that physical and mental diseases are intricately interwoven in a large percentage of those dying insane. Dr. Ellis (1) recognized the influence of diseased viscera as causative factors in inducing mental obliquity; showing that a brain, especially one coming from poor stock originally, was a very sympathetic organ and sooner or later shared a like dissolution of its cells. He seemed to take no notice, however, of the possible influence of the circulatory system upon brain nutrition. This latter subject was taken up and treated at some length by T. Duncan Greenlees (2), his conclusion being in brief that a diseased heart is more frequently found among the insane than sane; 12.94 per cent of the living insane having some form of organic heart affection according to his personal observations, and 13.51 per cent of deaths were directly attributable to it. That the hearts are more frequently hypertrophied, the circulation more sluggish, as evinced by cold and even livid or swollen extremities, the arteries more frequently affected, especially in general paralysis, where they are often evidence of early prematurity; that heart lesions alter and affect the type of insanity to an often marked degree, and finally that cardiac and arterial diseases are the only ascertainable causes of mental derangement in a number of cases.

The gross results of one hundred and thirty-seven consecutive autopsies performed at the St. Lawrence State Hospital, where a full examination of all the organs were made are here tabulated. The average weight of the heart was found to be 10.99 ounces. Among the causes of death nephritis heads the list, the percentage being 10.94; heart disease 8.75 per cent; cardiac and vascular diseases complicating as follows: cardiac hypertrophy, 40.15 per cent; arterial sclerosis, 33.57 per cent; endocarditis, 28.08; granular or fatty degeneration of cardiac muscles, 7.3 per cent; cardiac dilatation, 7.3 per cent; chronic pericarditis, 3.6 per cent, chronic nephritis, 35.72 per cent. Though this latter

disease does not strictly belong to the circulatory classification, still the arterial changes at the outset, or subsequently, are so prominent that it may be well to call attention to the high percentage at any rate. The report of six hundred and two autopsies performed in the insane department of Vienna hospital showed the heart to be diseased in seventy-five cases, though some showed but slight change. Defour (3) in seventy-five per cent of his autopsies, Sutherland (4) in thirty-six out of forty-two post mortems, Burnam (5) in one hundred and sixty-nine out of five hundred necropsies.

These statistics could be multiplied indefinitely to corroborate the fact that heart and arterial disease play a very important part in influencing mental changes.

It would be interesting to keep a mental chart of a sane individual, noting the frequency of elation and depression which occur within normal bounds and compare it with the physical or systemic mood which accompanies it. It is well known that a sound brain must be supported by a healthy physique—the exception establishing the rule. There are many cases we can recall in our hospitals who, to all appearances, are healthy in body, but a careful examination of the blood will show some positive deviation from the normal, though in many cases it may be slight. If these patients are put upon tonic treatment or even, in well selected cases, alteratives, with proper diet for a sufficient length of time, an examination of the blood will show an approach nearer a normal condition with often a betterment of the mental state. Acute cases are, of course, referred to. Whether at the outset the lowering of the blood's nutrition be due to the inhibitory or trophic influence of the brain *per se*, or to the slight but possibly numerous physical defects, is still an open question.

Should a man with naturally buoyant spirits, with an abundance of physical activity and mental energy, become subjected to a systemic intoxication, either through the influence of alcohol or other deleterious agencies, he will probably develop an active or more or less elated form of mental disturbance. On the other hand, a person with hypochondriacal or pessimistic views, especially the phlegm-

atic, is quite apt to show early signs of depression until the auto-intoxication is relieved. The latter class of patients, especially the hypochondriacal, are quite apt to immediately sympathize with any physical defect that is more or less prominent, and their delusions augmented and even confirmed till finally they are hopelessly fixed. At the present time I have under observation a patient, a female, second attack of acute melancholia, who believes that she is drying up and must retain all the watery elements for her body. When she was admitted, her bladder was enormously distended and a large amount of urine was drawn off per catheter. For the first few days she was regularly catheterized, but fearing lest her delusions might be confirmed thereby, the nurse was instructed to use persuasion instead, which has gradually become successful, though at intervals catheterization has to be resorted to. Nevertheless there is scanty micturition, the amount being less than half the normal, thus showing the sympathetic and possibly complementary influence of the cerebral centers.

While the mental changes in a case of insanity at the outset may be only functional, the circulatory system is becoming more and more deranged as evinced by a high tension pulse, sclerosed arteries, cardiac hypertrophy, then organic changes ensue in the viscera, especially in the excretory organs; finally the cerebral cells sharing like changes either microscopically or macroscopically. Is not this the course of a typical case of insanity going on to chronicity and dementia? In some cases the changes are very rapid, in others they extend over a long period of years, still in others the atrophic changes begin early, indeed almost simultaneously with the sclerotic changes. In these cases we find upon post-mortem the small heart or maybe the dilated heart, instead of the enlarged one.

It is said that in general paralysis the morbid changes originate in the vascular system of the brain, there being a predilection to that site unexplainable, and there the toxic influences work with frightful rapidity upon an easy prey; nevertheless organic changes are steadily progressing throughout the rest of the economy with scarcely slower strides.

That many cases of melancholia are the result of auto-intoxication—the stuporous, the typical, the acute and sub-acute (the result of less auto-intoxication), the atypical—is the latest theory and the most reasonable and tenable. That like cases of mania are due to auto-intoxication is still to be proven. I still believe that the causes of mania are extraneous; that melancholia is due to toxines or ptomaines which are peculiar alkaloidal units, the result of the decomposition of organic substances within the system, the former deriving its etiology from the external world; also, that mania and melancholia are convergent diseases. They start with different symptoms and gradually approaching one another pass on to chronicity and when dementia is reached they present essentially similar symptoms. Then the delusions are fixed and whether they be of elation or depression it matters little as the treatment is the same in either case. Nevertheless, as there are no records to confirm this theory further speculation is useless. Yet the question naturally arises whether a case of acute delirium does not get into a condition of toxæmia or auto-intoxication as the natural result of previous infection from without.

Notwithstanding the effects of physical changes as the influencing or causative factors in mental derangements the blood *per se* must be looked for as the prime factor. There the effects of poisons, whatever they may be, must first be manifested. The blood corpuscles are the first to suffer, which is shown by poikilocytosis, an exceedingly common observation in the blood of the insane; the paralyzing effect of the poison also lessening the nutrition of the blood corpuscles noticeably by the lowering of the hæmoglobin percentage, the ratio of red cells and the increase of white discs. Then the oxidizing ability of the blood is damaged and there is a slow accumulation of poisons in the system until finally the effect may be overwhelming; or there is a gradual accommodation (or compromise) upon the part of the blood till it finally eliminates the toxic agents or there is a condition of chronicity established. While the non-oxidation of these poisons is in process the system begins to suffer not only from a lack of nutrition but from the irritation of

these foreign elements. First, the pulse tension shows itself, irritation of the vasa vasorum, then thickening of its walls, next the capillaries and arterioles, sclerosis of the remaining vascular system, the renal organs, etc. Though this irritation stimulates nutrition it is for the interstitial part of the economy at the expense of the parenchymatous. The earliest organs to show these parenchymatous changes are the heart and kidney. Thus, the two-fold function of the blood, viz., to supply nutrition in proper quantity for the entire body and to carry away the effete organic matter or to break up extraneous toxic matter, is reduced just in proportion to the normal resistance which has acquired its virtue from "heredity."

There is much to learn about the microscopical nature of the blood as to how its integral parts behave under the effects of various irritants. Continual but slow advances are being made outside of the field of mental diseases. This latter field appears to be a rich one and there is an abundance of opportunity for extensive original work.

The results of sixty-two examinations of the blood at this institution are here reported. For the enumeration of the red and white corpuscles and the estimation of the hæmoglobin Gower's instruments were used. The staining method used was the one originated by Ehrlich, the blood smears being fixed to cover glasses by placing them upon a copper plate and subjecting them to a temperature of 100 degrees C. for one hour. Then the cover glasses were placed face downward on Ehrlich's neutrophilic stain for four minutes, washed in different dishes of distilled water a few seconds to remove the excess of stain, then dried between fine filtered paper and mounted in Canada balsam. Six separate smears in each case were made and examined to insure as accurate results as possible.

The series of examinations, comprising nineteen cases of mania, nineteen cases of melancholia, nineteen cases of dementia and five cases of general paralysis, were made during the summer and fall months when all but four of the sixty-two patients were taken out-of-doors daily for exercise. The acute and subacute cases were examined within ten

days after admission with the exception of a few who could not be examined for various reasons until about one month after admission.

Three tables are given, No. 1 showing full examinations of cases of mania, No. 2 of melancholia and No. 3 a condensed table of the three forms for the sake of comparison. Included in this last table the average results of five cases of general paralysis are tabulated. Frequent reference to table No. 3 will help to comprehend the following facts: First—The results of the cases of dementia will be given without a full chart on account of limited space. The total number of red discs per c. m. were summed up and divided by the total number of cases examined and the average was found to be 4,816,842.1. A similar proceeding with the leucocytes showed an average of 10,473.68. The average amount of hæmoglobin was found to be 78.368 per cent. Stains were made in six cases with variable results. (*Vide* Table No. 3). Eosinophiles were absent in four cases, abundant in one and present in one. Polynuclear neutrophiles normal in four, abundant in two. Irregularity of red discs in four. Plaques prominent in six; granular matter in six; leucocytes appearing abnormally small in three.

The cases of general paralysis showed an average of the red discs per c. m. to be 4,266,000, the leucocytes 8,800 and the hæmoglobin per cent 74.2. Only two stains were made and showed negative results. Irregularity of red discs was very characteristic in all five; plaques and granules were prominent in two.

Similar proceedings in mania showed 5,101,052.631 red discs to the c. m.; 8,315.72 leucocytes to the c. m., the average amount of hæmoglobin found to be 75.21. Eosinophiles abundant in eight, present in three and absent in one. Polynuclear cells about normal in eight, abundant in four. In one case mononuclear cells were very abundant. Distortion of red discs prominent in four, abundance of plaques noticeable in five, granules in one and unusually small leucocytes in three cases, two cases showing megalocytes.

In melancholia the following results were obtained:

4,826,315.78 red discs, 7,947.31 white discs to the c. m. and 70-731 hæmoglobin per cent. Eosinophiles *absent in ten cases* and present in two. Polynuclear cell about normal in ten, abundant in two. Mononuclear cells abundant in one case. Poikilocytosis in nine, plaques in nine, granules in four, leucocytes negative and megalocytes in two, thus showing the percentage of hæmoglobin to be the lowest in cases of melancholia, highest in dementia, with mania occupying intermediate percentage; the leucocytes to be increased the most in dementia, intermediate in mania and the nearest to normal in melancholia. The lowest number of red discs to c. m. were found to be in dementia, the most in mania. Ten cases of melancholia showed an entire absence of eosinophilic cells, while eight cases of mania showed an abundance of eosinophilic cells and presence of them in three. Poikilocytosis was very characteristic in cases of melancholia; mania and dementia taking second place. Granular matter was found to be most abundant in cases of dementia and next in cases of melancholia.

Therefore in a brief résumé we are able to draw the following conclusions:

1st. In all cases of insanity there is a deterioration of the blood showing a diminution of red cells, an increase of white cells and a low percentage of hæmoglobin.

2d. That cases of melancholia show the lowest amount of hæmoglobin. The eosinophilic cells are entirely *absent* in the majority of these cases and that poikilocytosis is characteristic in this disease.

3d. That eosinophilic cells are much increased in mania, though leucocytosis is not proportionally increased.

4th. That there is an intimate relation between an hypertrophied heart, sclerosed arteries, lowered blood nutrition and the course of mental diseases.

5th This report, as far as it goes, is a corroborative one for the most part in respect to blood examinations. The new and unusual results are derived principally from the stained specimens.

Many articles have been written regarding the blood of

the insane, the most extensive writer being MacPhail (6) who says in his summing up:

1st. There is no evidence to show that anæmia in itself is a cause of insanity, yet an anæmic condition of the blood is, undoubtedly, in many cases intimately associated with mental diseases.

2d. That the blood in the demented class of asylum patients is deficient in hæmoglobin and in red blood discs, and that deterioration progresses as age advances.

3d. Blood is below the normal standard in general paralysis (which is also found true in the five cases reported above).

Sutherland (7) concludes that in mania the general leucothæmic condition frequently exists and that in general paralysis the blood is much deteriorated.

Wenckler (8) concludes that the blood in all forms of insanity is deteriorated and the deterioration most marked in the depressed forms. That paroxysms whether of mania or melancholia produce a lowering of the blood's nutrition and, while the demented class take on flesh, the percentage of hæmoglobin sinks lower as age advances.

Smyth (9) in one hundred thirty-seven cases reached the same conclusions as MacPhail.

Steele (10) in thirty-five cases of melancholia concludes in the main:

1st. That there is a deficiency of red cells and hæmoglobin whether the cases be acute or chronic.

2d. That in a large percentage of these cases poikilocytosis is prominent, and that tonic treatment shows a betterment of the integral parts and an amelioration of the mental symptoms.

Seppel's (11) results coincide with those of MacPhail.

Kryiakewicz (12) made an examination of a number of stained specimens of all classes of insanity, but especially of general paralysis. He found an accumulation of eosinophilic cells in cases of climacteric and sexual mania, general paralysis, simple mania and melancholia showing no increase. As to the general deterioration of the blood he corroborates other authors.

Burton (13) concludes: 1st. In cases of dementia there is an increase of white cells. 2d. In four cases of general paralysis a diminution of white cells (which was also observed by Roncoroni.)

(The result in five cases tabulated in my report shows, in its average, a decided increase of leucocytes.)

The conclusions of the foregoing authors comprise all the literature upon the blood of the insane at my disposal. Though they differ as regards some minor points, yet they all argue that there is a lowering of the blood standard in cases of insanity.

There seems to have been but little done with the staining methods. Here the results have been variable. That the eosinophilic cells play an important part in the makeup of the blood is evident and possibly the same is true as regards the polynuclear neutrophiles; yet little is known of their natures. The theory has recently been advanced by Hankin, (whose articles I greatly regret not to be able to refer you to, but hope to in my next paper) that the phagocytic or toxic destroying power of the blood is due to eosinophilic cells and he shows a number of elaborate experiments to confirm his belief. On the other hand, Vaughn (14) holds the idea that phagocytic power of the blood is due to polynuclear neutrophiles. In cases of melancholia the polynuclear neutrophiles are about normal and the eosinophiles are prominently deficient. Is it possible by the use of some drug where you increase metabolism to also increase the number of eosinophilic cells and thus free the system of the toxic influences which are supposed to be the cause of melancholia? In my next paper an endeavor will be made to show by the use of a nutritive ferment the effects of it upon the blood, especially upon the eosinophiles and polynuclear neutrophiles; thus hoping to contribute something to this recent and interesting work.

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MANIA

Red Discs to the c.m.	White Discs to the c.m.	Hemo- globin p. cent.	Stains Microscopically.	Remarks. Prominent Abnormalities.
4,880,000	8,000	94	Eosinophiles present. Polynuclear cells normal.	Leucocytes very small.
3,170,000	7,000	84		
3,000,000	9,000	50	Eosinophiles abundant. Polynuclear cells normal.	Megalocytes. Plaques.
4,900,000	5,000	94		None.
3,510,000	9,000	55		None.
4,550,000	11,000	74		Plaques.
3,950,000	3,000	33	Eosinophiles abundant. Polynuclear cells abundant.	Red. Poikilocytosis.
4,530,000	4,000	75	Eosinophiles present. Polynuclear cells normal.	Red. Poikilocytosis.
4,550,000	10,000	40	Eosinophiles abundant. Polynuclear cells abundant.	Red. Poikilocytosis.
4,870,000	4,000	100	Eosinophiles present. Polynuclear cells normal.	Plaques. Megalocytes.
6,410,000	9,000	90	Eosinophiles none. Polynuclear cells abundant.	None.
4,100,000	29,400	70	Eosinophiles abundant. Mononuclear cells abundant. Polynuclear cells abundant.	Plaques.
5,200,000	6,000	100		None.
4,800,000	6,000	110		None.
3,100,000	8,000	72		None.
4,450	4,000	60	Eosinophiles abundant. Polynuclear cells normal.	Granules.
4,570,000	11,000	68	Eosinophiles abundant. Polynuclear cells normal.	Red. Poikilocytosis.
5,740,000	10,000	85	Eosinophiles abundant. Polynuclear cells normal.	Leucocytes very small.
4,430,000	5,000	75	Eosinophiles abundant. Polynuclear cells abundant.	None.
				Leucocytes small.

MELANCHOLIA.

Red Discs to the c. m.	White Discs to the c. m.	Hemo-globin p. cent	Stains Microscopically.	Remarks. Prominent Abnormalities.
4,700,000	5,000	60	Eosinophile one. Polynuclear cells normal.	None.
4,170,000	4,000	80	Eosinophiles none. Polynuclear cells normal.	Red. Pale. Poikilocy-tosis.
5,700,000	13,000	74	Eosinophiles none. Polynuclear cells normal.	Red. Poikilocytosis. Plaques abundant.
5,200,000	3,000	70	Eosinophiles none. Polynuclear cells normal.	Red. Poikilocytosis. Plaques abundant.
6,000,000	8,000	50		Granules. Plaques. None.
5,500,000	5,000	74	Eosinophiles none. Polynuclear cells normal.	
5,380,000	5,000	80	Eosinophiles none. Polynuclear cells abundant. Mononuclear cells abundant.	Red. Poikilocytosis. Granules. Plaques.
4,500,000	10,000	50	Eosinophiles none. Polynuclear cells abundant.	None.
5,400,000	4,000	85	Eosinophiles none. Polynuclear cells normal.	Plaques. Granules. None.
5,600,000	6,000	74	Eosinophiles none.	
4,800,000	8,000	70	Polynuclear cells normal.	
4,560,000	4,000	88	Eosinophiles none. Polynuclear cells normal.	Red. Pale. Plaques.
4,500,000	5,000	65	Eosinophiles none. Polynuclear cells normal.	None.
5,550,000	10,000	70	Eosinophiles none. Polynuclear cells normal.	Red. Poikilocytosis. Plaques.
4,800,000	8,000	70		Red. Poikilocytosis. Plaques.
4,830,000	17,000	50		Red. Poikilocytosis (?). Megalocytes, Plaques.
3,880,000	13,000	88		
3,400,000	11,000	70		Red. Poikilocytosis. Granules.
4,430,000	12,000	76		Red. Poikilocytosis. Megalocytes.

CONDENSED TABLE OF THE THREE FORMS SHOWING COMPARISONS.

Form.	Average of Red Cells per c. m.	Average of White Cells per c. m.	Average Hæmo- globin per cent.	Microscopical.	Prominent Abnormalities.
Mania	5101052 $\frac{881}{1000}$	8315.78	75.21	Eosinophiles abundant in 8, present in 3, ab- sent in 1. Polynuclear Neutrophiles nor- mal in 8 abundant in 4. Mononuclear Neutrophiles abundant in 1.	Poikilocytosis in 4. Plaques in 5. Granules in 1. Leucocytes very small in 3. Megalocytes in 2.
Melan- cholia.	4826315 $\frac{781}{1000}$	7947 $\frac{81}{1000}$	70 $\frac{781}{1000}$	Eosinophiles ab- sent in 10, present in 2. Polynuclear Neutrophiles nor- mal in 10, abun- dant in 2. Mononuclear Neutrophiles abundant in 1.	Poikilocytosis in 9. Plaques in 9. Granules in 4. Leucocytes — Megalocytes in 2.
De- mentia	4816842 $\frac{1}{10}$	10473 $\frac{68}{1000}$	78 $\frac{868}{1000}$	Eosinophiles none in 4, present in 1, abundant in 1. Polynuclear Neutrophiles nor- mal in 4, abun- dant in 2.	Poikilocytosis in 4. Plaques in 6. Granules in 6. Leucocytes very small in 3.
Gen. Paral- ysis.	4266000	88000	74 $\frac{8}{10}$	Eosinophiles present in 1, ab- sent in 1. Polynuclear Neutrophiles nor- mal in both.	Poikilocytosis in 5. Plaques in 2. Granules in 3.
Aver- age to- tals in the 62 cases.	4752552 $\frac{8874}{1000}$	8880 $\frac{498}{1000}$	74 $\frac{687}{1000}$		

(To be continued).

ON THE USE OF THYROID EXTRACTS IN MENTAL DISEASE, WITH REPORT OF CASES.

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The use of thyroid gland of animals, preferably sheep thyroid, in therapy, has heretofore occupied a somewhat limited field which of late has been gradually extending until it now comprehends a diverse array of disorders having few features in common. Its use in myxoedema, sporadic cretinism and goitre has given excellent results, but its application to the classic forms of mental disease has been so recent and the literature on the subject so meagre that our original investigations were mostly of an experimental nature.

During the course of our observations we have seen the accounts of Bruce,* MacPhail† and Clark,* on thyroid feeding in certain forms of insanity. The admirable monograph of Bruce has since been supplemented by an additional report giving results of treatment in sixty cases. Out of that number forty per cent recovered under thyroid treatment. This phenomenal showing is very misleading and can only be accounted for by the fact that acute cases were subjected to treatment, the majority of whom would have recovered without special therapy. In fact, thirteen of his seventeen female recoveries were either puerperal, lactational or climacteric cases.

For many years alienists and asylum physicians have observed that changes in cell nutrition or tissue metabolism have modified or influenced certain forms of mental disease. In the majority of cases this has been a clinical observation made during the course of some intercurrent physical disease. Almost every one who has

* Bruce: "Thyroid Feeding in Insanity," *Journal Mental Science*, Vol. XLI, p. 50.

† MacPhail: "Effect of Thyroid Feeding on Insanity," *Lancet*, 1894, No. 2.

‡ Clark: "Thyroid Feeding in Some Forms of Mental Trouble," *American Journal of Insanity*, Vol. LII, No. 2.

had any experience with the insane has seen recoveries occur in notoriously unfavorable cases, apparently due to the intercurrent of some acute febrile affection such as thyroid fever, diphtheria and pneumonia or to some sudden shock such as usually results from scalds, bruises or fractures. These recoveries point out the influences over cell-nutrition caused by hyperpyrexia; by changes in the circulation; by modified nervous influences or brain stimulation. They cover the entire range of acute mental disorders as well as many in which the acute stage has passed off and who appear on the verge of chronicity. Remarkable recoveries have been recorded as due to intercurrent disease after the lapse of many years of supposed dementia.

Our experiments with thyroid were taken up with three main objects in view: *First*, to definitely ascertain its physiological action. *Second*, to determine thereby in just what classes of cases it might best be used to further recovery. *Third*, to apply it therapeutically to those cases in which it offers the best results.

At the outset we desire to emphasize the fact that extracts made from the thyroid gland have a definite physiological action; that an unvarying strength of any given amount can be obtained by proper preparation; and that the true thyroid preparations have no relationship with the so-called animal extracts which have achieved so much unfavorable notoriety of late.

The preparation which we use in this hospital is the desiccated thyroid extract,* ten grains of which equal an average fresh gland of the sheep. Sixteen parts of the dry extract represent one hundred parts and one grain equals six and one-quarter grains of the fresh gland. The preparation when freshly made was found to be of uniform strength; fairly agreeable to take and free from disagreeable effects in moderate doses.

The dosage and method of administration varied according to the personal idiosyncrasies of the patient. In most cases five grains was the initial dose and was given in

* Parke, Davis & Co.

capsules. The action of this dose was closely watched for a few days and then gradually increased, unless the symptoms contraindicated its further use. With the exception of two cases, little or no reaction was obtained from five grains and the dose was increased to ten grains. Nearly all cases reacted more or less quickly to this dose and in many the physiological limit seemed to be attained. In a smaller number of cases the reaction to ten grains was milder and fifteen were soon given. This seemed to be the maximum dose that could be given with safety for any length of time and then only in patients whose physical health was impaired in a slight degree if any. A few of the patients, notably cases of melancholia with delusions of persecution, refused to take the extract either in capsule or powder. It was then disguised by mixing with some regular article of diet and regularity of administration was thus obtained.

To avoid error in making observations or recording notes these cases were placed in charge of trained nurses to whom special instructions were issued.

Each case was provided with a set of clinical records such as have been adopted in this hospital for systematic medical work, the set comprising temperature, weight, food, mental and sleep charts, ward notes and physician's note sheet. The patients were constantly under the observation of nurses and were visited and examined three or four times daily by physicians in charge. The temperature, pulse and respiration were taken three times a day (7 A. M. and 1 and 7 P. M.), and the diet carefully regulated but not limited. Urine and blood examinations were made from time to time and the elimination of nitrogenous compounds, notably urea, carefully recorded. (See chart No. 3).

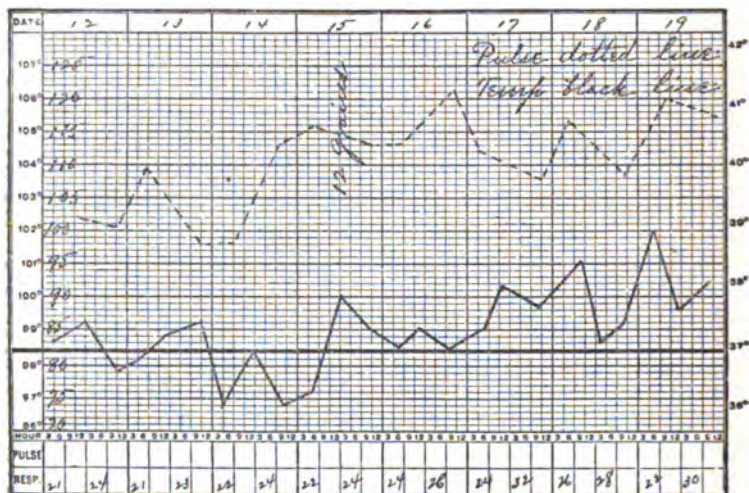
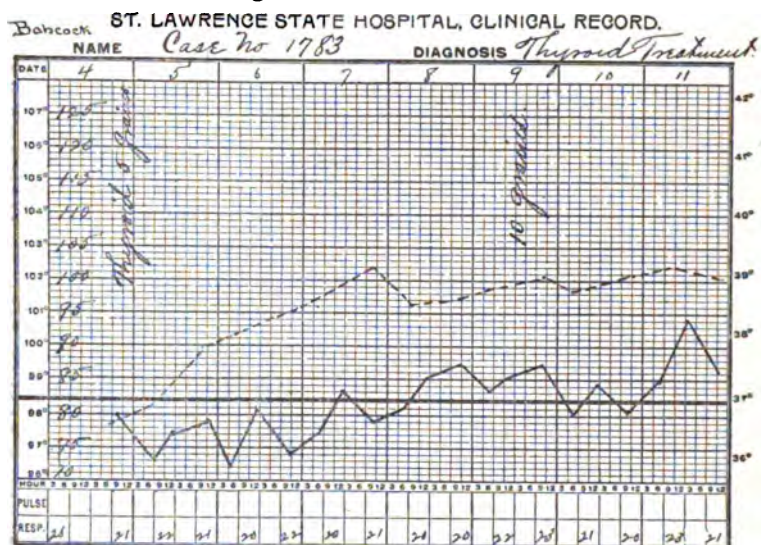
CASE No. 1783. R. B. J., female; admitted August 15, 1894; acute mania: age. 22: single: housekeeper: native of New York. Habits good. Family history defective; sister insane but recovered. Accompanying diseases, chlorosis and metrorrhagia. Duration of attack previous to admission, six weeks. Mental disorder inaugurated by development of hallucinations followed by persecutory delusions, loss of memory and confusion with inability to fix attention. On admission patient was quiet and dull, but answered questions with slight hesitation. In conversation manifested delusions of persecution and

suspicion. Soon after admission became confused, excited and subject to great motor restlessness. Delusions developed fully and took on a decided religious coloring. For a few months paroxysms of emotional excitement and motor activity alternated with intervals of comparative quiet without any degree of regularity.

On first administration of thyroid extract patient had been confused, excited and disorderly for several months without appreciable improvement in mental condition or evidence of organic changes. Sept. 25th. Treatment inaugurated by the administration of five grains of desiccated extract. Patient on disturbed ward and too excited to permit physical examination. Sept. 27th. Steadier; less noisy; slight rise of temperature, patient placed in bed. Oct. 1st. Quieter and more orderly. Remains quietly in bed. Talks quite rationally and is less emotional. Temperature accelerated. (See chart No. 1). Oct. 4th. Asked for fruit and inquired about her home and friends, not having previously mentioned the latter during her residence in hospital. Still quite restless and emotional. Temperature normal; pulse accelerated. Oct. 8th. During the past few days condition has been stationary; temperature and pulse gradually rising. Oct. 10th. Thyroid increased to ten grains. Oct. 14th. Uniformly quiet since last note; no especial change. Oct. 15th. Thyroid increased to fifteen grains. Oct. 17th. Allowed to be dressed and come out on ward but patients seemed to excite her; sent to quiet convalescent ward. Oct. 20th. Steady improvement followed transfer. Pulse and temperature greatly accelerated during the past few days; converses coherently and rationally and wrote intelligent letter to friends. Oct. 24th. Thyroid stopped. Oct. 28th. Improvement steadily continues. No evident hallucinations or delusions and aside from slight mental instability, acts natural and appears to be rapidly recovering. Nov. 10th. Stronger and brighter. Has gained several pounds in weight and is now eating and sleeping well. Nov. 24th. Has steadily continued to gain greater self-control. Exhibits no delusions or exhilaration and is evidently rapidly regaining her mental equilibrium.

CASE No. 1807. M. P., female; admitted September 13th, 1894; acute melancholia, *cum stupor*; age, 38; single; housekeeper; native of New York. Habits good. Family history defective; father and two sisters insane. Second attack. First attack twenty years subsequent with good recovery. For one week previous to admission was alternately excited and depressed and highly delusional. Manifested active suicidal tendencies and made several attempts at self-destruction within a few days of commitment. On admission was quiet, depressed, apprehensive and delusional. Was fairly rational in conversation and appeared to realize her condition. Following admission depression deepened and condition of stupor was soon reached. Persistently refused food and medicine, would not converse, and manifested no interest in surroundings. After prolonged attack of stupor

Chart No. 1

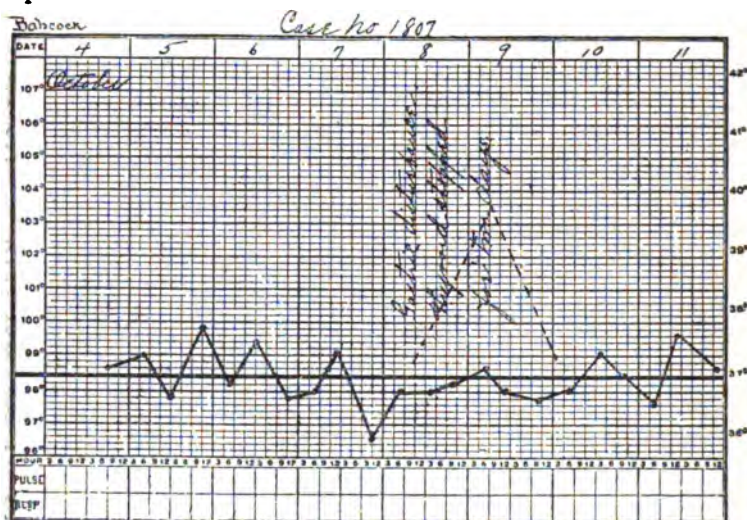


became brighter and took greater interest in objective influences. She still continued resistive, however, and refused to converse or hold any intercourse with associates.

On first administration of thyroid extract she had been stuporous, reticent and indolent for several months but no evidence of permanent mental change was apparent. Her mental condition at the beginning of treatment was one of cerebral exhaustion or mental hebetude following attack of acute stuporous melancholia. Sept. 25th, 1895. Treatment inaugurated by the administration of five grains of extract three times a day. Owing to her reticence and continued resistance no physical examination could be made at the outset. Sept. 28th. No change yet apparent. Thyroid has been administered in milk or food as she has persistently refused to take it otherwise. Pulse and temperature uninfluenced. Sept. 30th. Last evening brightened up, became more observant and talked cheerfully to the nurses. Pulse accelerated for past few days and temperature slightly elevated. Appetite has improved and she is sleeping eight hours each night. Oct. 3d. Thyroid increased to ten grains. Temperature elevated to 100.2°, pulse slightly accelerated. Brighter than for several weeks past; held short conversation with nurse this morning, answering direct questions and apparently taking increased interest in surroundings. This is the first time she has spoken for seven months, Oct. 5th. Volunteered to do some sewing this morning. There has been a noticeable change in habits as she was formerly untidy and occasionally filthy, but for the past few days she has properly observed the calls of nature and exhibits greater regard for personal appearance. Oct. 6th. Manifested slight evidence of gastric irritability. Thyroid reduced to five grains temporarily. Oct. 7th. Nausea and vomiting has now subsided; appetite improved. Steadier, brighter and fairly rational. Thyroid again increased to ten grains. Oct. 9th. Stomach became irritable again yesterday and has continued to cause more or less trouble ever since. (See chart). Thyroid temporarily discontinued. Oct. 11th. Thyroid again exhibited in ten grain doses. Steadily improving, sat up for a short time last night and talked and joked with fellow patients and nurses. Asked for fruit and reading matter. Gave a vivid account of her recent condition to physician, saying that she knew that she was improving; that she felt different than heretofore; that she felt as though she had just awakened from a long sleep and seemed to be a new person entirely. Began to make plans for the future and appears to expect and anticipate recovery. Oct. 14th. Improvement continues. Is observant, talkative and up and about wards daily. Oct. 20th. Goes out walking every day, attends entertainments and Sunday services and appears to be rapidly improving. Nov. 1st. Condition stationary and remains as last noted. Fairly rational but inclined to be indolent. Nov. 15th. Still quite indolent but appears to be growing stronger daily. Has gained greatly in flesh and markedly improved in physical health. Quantitative examination of excre-

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tion of urea was frequently made during course of treatment. Records show average daily increase of two-tenths of one per cent until the daily excretion approximated normal amount. Gradual mental improvement accompanied the increased elimination of nitrogenous products.



Case No. 1841. E. W., female; admitted October 21st, 1894; acute mania (recurrent); age, 41; single; domestic; native of New York. Habits good. Family history bad; maternal aunt and uncle insane. Previous to present admission (second) patient manifested mild excitement, destructive tendencies and active delusions regarding electrical phenomena. On admission was quiet and discussed her attack with fair degree of intelligence, saying that return to hospital was entirely voluntary. Talked freely of her delusions regarding electrical currents and partially acknowledged their subjective origin. Following admission patient developed, from time to time, attacks of excitement, accompanied with great motor restlessness, persistent hallucinations and active delusions. For the past four months periods of excitement have occurred frequently and alternated with short intervals of depression. Delusions persistent and active.

On first administration of thyroid extract mental condition had been stationary for several weeks, remaining as above noted. She does not yet manifest any evidence of permanent mental disorder, but development of incipient stages of terminal dementia seem to be possibilities of the near future. Treatment commenced on Sept. 25th by administering five grains of the extract in food. Physical examination on first day of treatment revealed sluggish reflexes and generally delayed sensory

impulses. Sept. 26th. Slightly apprehensive and restless. Sept. 28th. Complains of cephalic and supraorbital pain. Oct. 1st. Quiet and orderly. Temperature and pulse accelerated, temperature reaching 100.6° and pulse ranging between 85 and 117. Face flushed and skin moist. Oct. 5th. Thyroid increased to ten grains. During past twenty-four hours has been somewhat excited and very restless. Temperature remains as last noted; pulse ranges between 108 and 130. Oct. 9th. No essential change. Reflexes exaggerated and respond to slight stimuli. Pulse still greatly accelerated, while temperature oscillates between 99° and 100°. Oct. 14th. During past three days pulse has ranged between 115 and 135, while temperature has remained as last noted. Thyroid increased to fifteen grains. Pulse rate immediately dropped to 100. Oct. 20th. Mental condition brighter, patient talks rationally and converses coherently. Delusions fast disappearing; less suspicious than formerly; pulse and temperature remains as last noted; thyroid discontinued owing to evidence of gastric irritability. Oct. 26th. Quiet, orderly and rational. Mental improvement has steadily continued and delusions are not now apparent. Has failed gradually in strength and lost much flesh; weight, 110 pounds. Appetite excellent and is sleeping seven hours nightly. Nov. 5th. Mental improvement steadily continues. Patient growing stronger and increasing in flesh; works daily in sewing room and is cheerful and contented. Nov. 12th. Apparently recovered. Relatives were to-day notified that she was ready to be paroled. Nov. 28th. Paroled into custody of sister for 30 days.

CASE No. 1878. A. L. T., female; admitted December 8, 1894; acute mania; age, 37; married; housekeeper; native of New York. Habits and family history good. Married at the age of fifteen and soon after contracted syphilis from husband. A few years ago became interested in theosophy and was easily excited by religious subjects. When admitted mental disorder had been very active for one week. Constantly moved about and talked incoherently in whispers and seemed to be under influence of some delusion. Shortly following admission she had several paroxysms of active excitement, exhibiting delusions and much mental confusion. Following maniacal outbreaks would have a more or less prolonged period of prostration. These finally became less frequent and patient gained in strength and flesh. In April, 1895, passed through an attack of typhoid fever which reduced her very much in strength and did not seem to improve mental condition.

On first administration of thyroid extract mental condition had been stationary for several months; organic dementia appeared well developed and her condition essentially chronic. Treatment was tried on this patient in order to determine influence of thyroid on organic cerebral disease. Treatment commenced on Oct. 30th by the administration of five grains of thyroid extract three times a day. Exhibited

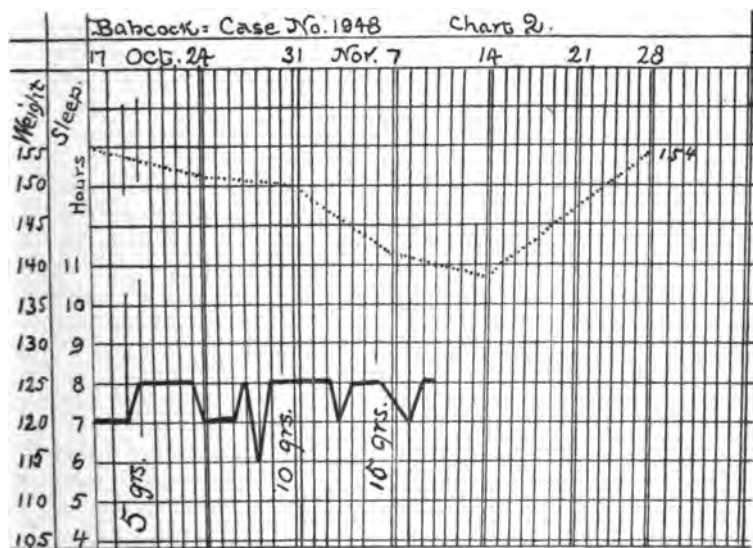
febrile and circulatory reaction much quicker than any other case and temperature alternated between 98° and 102° for several days with pulse that was correspondingly accelerated. Nov. 3d. Thyroid increased to ten grains. Temperature 101.4° and pulse 110; no appreciable mental change. Nov. 7th. Gained one pound in weight and is eating and sleeping well. Temperature 99.2°, pulse 106. Nov. 11th. Marked gastric irritability this morning followed by nausea and vomiting after midday dose of extract. Talks incoherently, takes little notice of surroundings and appears dull and confused. Temperature 100.6°, pulse 102. Tongue heavily coated and teeth covered with sordes, patient presenting symptoms of mild typhoid condition. Nov. 12th. Much exhausted; reflexes exaggerated and skin hyperæsthetic. No mental improvement. Daily estimations of the excretion of urea showed slight increase. Treatment discontinued. Mental condition remains uninfluenced though the reaction was good. Nov. 18th. No change since treatment was discontinued.

CASE No. 1931. A. R., female; admitted February 16, 1895; acute melancholia; age, 32; married; housewife; native of Germany. Habits good. Family history defective, as one sister is insane. Alleged causes, nervous temperament, poverty and worry. Duration of attack previous to admission six months. Early history not ascertained. On admission patient was quiet and orderly, moderately depressed and delusional. During examination following admission manifested hallucinations of hearing and illusions of sight accompanied with delusions of an ill-defined character. Was emotional, apprehensive of personal danger and suspicious of those about her. Anæmic and sallow in appearance and reduced in physical health. For several weeks following admission remained confused, stupid and emotional. After three months of marked depression and mental confusion brightened up, became stronger and took greater interest in her surroundings. She still remained, however, dull, confused and indolent.

On first administration of thyroid extract mental condition had been stationary for several weeks and remained as above noted. Sept. 27th. Treatment inaugurated by administration of five grains of extract three times a day. Physical examination revealed normal sensibility and reflexes, with no evidence of spinal or cerebral disorder. Oct. 2d. Thyroid increased to ten grains. Oct. 5th. Temperature elevated $1\frac{1}{2}$ degrees and pulse somewhat accelerated. Influence of thyroid on mental condition manifested by lessened degree of resistance and increased appreciation of surroundings. Has become more cheerful and from condition of complete indolency suddenly developed industrious habits, volunteering to assist in sewing and ward work. Oct. 7th. Less confused than formerly. Developed symptoms of vertigo and became quite ataxic. Oct. 10th. Continues cheerful, industrious and less stubborn. Symptoms of vertigo and muscular incoördination continue. Oct. 19th. Remains as last noted. Oct.

29th. Thyroid discontinued. Mental condition has been stationary for the past ten days. Nov. 6th Gained in weight and strength since thyroid was stopped. Mental condition has correspondingly improved and she is now steadier, brighter and more rational than at any time during her residence in the hospital. All symptoms of vertigo and muscular incoördination disappeared soon after thyroid was discontinued. Nov. 12th. Remains as last noted. Though she has manifestly improved, convalescence suddenly ceased after a moderate degree of improvement had been reached.

CASE No. 1948. R. J. M., male; admitted March 12, 1895; acute melancholia; age, 25; single; farmer; native of New York. Has used liquor moderately. Family history defective as mother and mother's sister were insane. Duration of attack previous to admission, five months. On admission patient was depressed, reticent and self-absorbed. Following admission continued depressed, delusional and refused to speak; gained in weight and greatly improved in physical health.



On first administration of thyroid extract condition was as last noted. Physical health had greatly improved, but mental condition had undergone no change. Oct. 17th. Treatment commenced by the administration of five grains three times a day. Face blank and expressionless but no evidence of dementia can be detected other than noted. Oct. 19th. Temperature elevated one degree and pulse slightly accelerated. No mental change. Oct. 22d. Temperature

and pulse normal. Thyroid increased to ten grains. Oct. 25th. No mental change; losing weight rapidly. Oct. 29th. Temperature elevated, ranging between 98.6° and 100°; pulse slightly accelerated. No mental change. Nov. 1st. Thyroid increased to fifteen grains. Nov. 4th. Increase did not affect temperature curve; pulse is more accelerated and ranges between 95 and 105. Nov. 6th. No mental change. Temperature normal during the past two days. Treatment discontinued as much dementia is now quite apparent. During three weeks' treatment lost 13 pounds in weight (See weight curve chart No. 2.) Nov. 29th. Mental condition stationary. Has gained 12 pounds since treatment was stopped

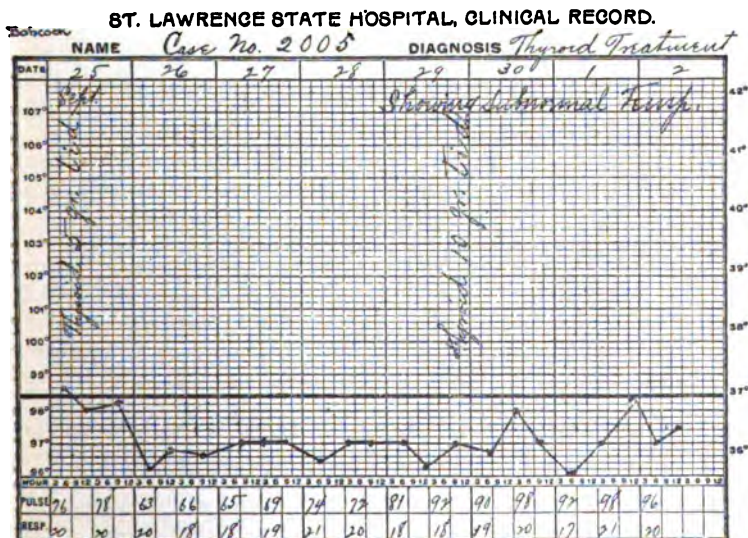
CASE No. 1982. M. C. M., female; admitted April 22, 1895; sub-acute melancholia; age, 33; single; housekeeper; native of New York. Habits and family history good. Duration of attack previous to admission, one year. Accompanying diseases, pityriasis rubra, goitre and pronounced deafness. On admission was quiet, confused, suspicious and depressed, expressing delusions of an ill-defined character. Physical condition poor. Refused to permit physical examination. Was placed on tonics and stimulating diet. Six months later mental condition had not essentially improved. Delusions continued imperative and domineering. Refuses to converse, avoids contact with any object and poses in one position for hours. Gained in weight and strength since admission.

On first administration of thyroid extract mental condition had been stationary for eighteen months. Delusions seemed to be fixed; extremely mysophobic. Dementia apparently present in mild degree, although latter condition was open to question. Our attention was drawn to this unfavorable case by the presence of an hypertrophied thyroid gland which seemed to annoy her and served as a basis for some of her delusions. The only other mitigating feature of the case was the doubtful nature of the dementia. Sept. 25th. Treatment inaugurated by administering five grains of extract three times a day. Patient refused medicine and extract was placed in food; refused physical examination. Sept. 28th. No appreciable change. Will not allow temperature or pulse taken. Oct. 3d. Delusions active. Reaction uncertain as she persists in refusing to have temperature taken. Oct. 5th. Thyroid increased to ten grains. Oct. 8th. Has grown weaker during the past few days and lost much flesh. Face flushed; salivary secretion increased and lower limbs oedematous. Continues resistive. Oct. 10th. Has become very weak and is so ataxic as to be hardly able to stand upright. Thyroid administered in food since treatment was instituted. Losing flesh rapidly but loss in weight can only be estimated as she refuses to be weighed. On account of increasing physical debility thyroid was stopped. During treatment resistance considerably diminished, but delusions persisted without alteration. Her thyroid gland decreased

in size and became somewhat tender during treatment but, as she refused to allow any one to touch her, the changes in size of the gland can only be estimated. If course of treatment did nothing more, it fairly well proved the chronicity of her case.

CASE No. 2005. J. M. G., female; admitted May 8, 1895; acute mania; age, 32; widowed; milliner; native of New York. Habits good. Family history doubtful as two uncles committed suicide. Neurasthenic from frequently recurring physical disease, having had diphtheria, smallpox, and uterine trouble. Maniacal attack abruptly followed nervous symptoms, two weeks before admission. On admission was emotional and somewhat confused but talked intelligently about her past excitement. Since admission has not shown active excitement, but has frequent attacks of depression with hysterical manifestations, during which she is irritable, confused and suspicious for a few days.

On first administration of thyroid extract condition had been stationary for several weeks, having but slightly improved since admission. No evidences of dementia apparent. Sept. 25th. Treatment commenced by the administration of five grains of extract three times a day. Physical examination negative. Sept. 28th. Temperature became subnormal immediately following first dose of the thyroid. (See chart, Case 2005.) Patient very much disturbed, delusions becoming very active. Sept. 29th. Thyroid increased to ten grains. Oct. 6th. Much excited; delusions active; refuses all medicine; thyroid given in food. Oct. 2d. Refused food and thyroid throughout entire day. Eloped at 7 p. m.



CASE No. 2174. N. J. G., female; admitted June 21, 1895; acute melancholia *cum stupore*; age, 22; single; school teacher; native of New York. Habits and family history good. Duration of attack previous to admission seven months. Alleged causes homesickness, nervous temperament and mental overwork. Has manifested suicidal tendencies. On admission patient was dull and stuporous, refusing to converse and apparently oblivious of surroundings. Four weeks after admission became excited and actively delusional. Period of agitation lasted one month and was followed by condition of stuporous depression resembling mental torpor on admission.

On first administration of thyroid patient had been dull and stuporous for several weeks. Treatment, tonics, massage, and static electricity. Sept. 25th. Treatment inaugurated by exhibition of five grains of extract three times a day. On the 26th had a mild attack of dysentery and thyroid was stopped until symptoms subsided. Dysentery has no apparent causative relation to the new treatment. Sept. 28th. Recommenced treatment as dysentery has been absent for twenty-four hours. Diet limited to milk. Oct. 1st. Restless for past two days and greatly disturbed at night. When actively disturbed is irritable, impulsive and vicious, attempting to assault nurses and fellow-patients. Oct. 4th. Disturbed nocturnally with much regularity. Appetite diminished; losing flesh. Oct. 8th. Thyroid increased to ten grains. Still restless and disturbed at night. Prescribed egg-nog three times daily. Seems to lack appreciation of surroundings but will answer direct questions in monosyllables. Oct. 11th. Visited by father; recognized him but would not converse and cried throughout most of his visit. Oct. 14th. Has been very emotional during the past twenty-four hours, alternately crying and laughing and exhibiting a variety of hysterical manifestations. Oct. 18th. Stronger and perhaps a little brighter. Up and dressed to-day. Oct. 20th. Condition stationary. Static electricity recommenced. Oct. 21st. Treatment discontinued; no result. Spray baths ordered in conjunction with electricity.

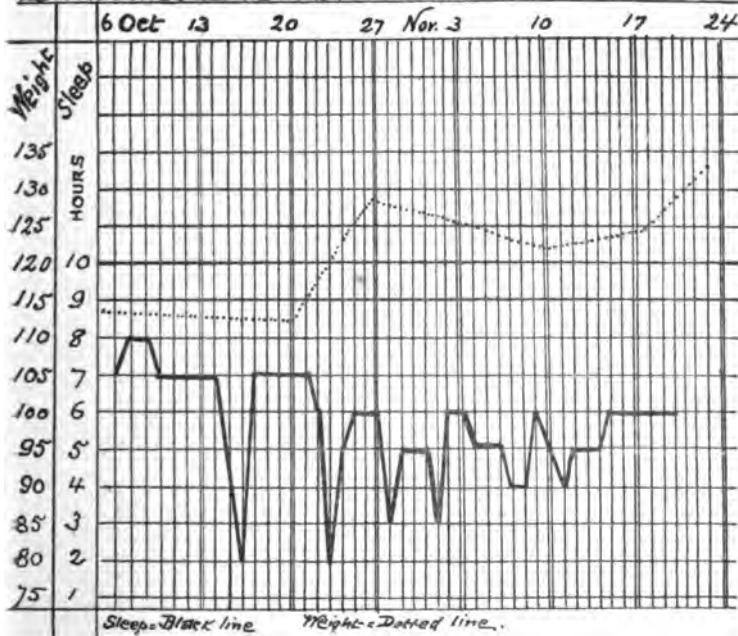
This case at the outset appeared to present an encouraging prospect for recovery and strenuous efforts were made during course of treatment to assist action of thyroid as a cerebral stimulant and arouse patient from her condition of lethargy. Entirely negative results obtained were somewhat of a surprise as a certain amount of reaction was looked for with much confidence.

CASE No. 2191. J. A. B., male; admitted July 1, 1895; acute melancholia; age, 19; single; farmer; native of New York. Family history defective; paternal grandmother insane. Patient has been inclined to dissipation. Duration previous to admission, one month.

On admission was dull, depressed and self-absorbed; replied to questions in monosyllables. Following admission patient remained profoundly depressed; refused to talk; remained in bed and was filthy in habits.

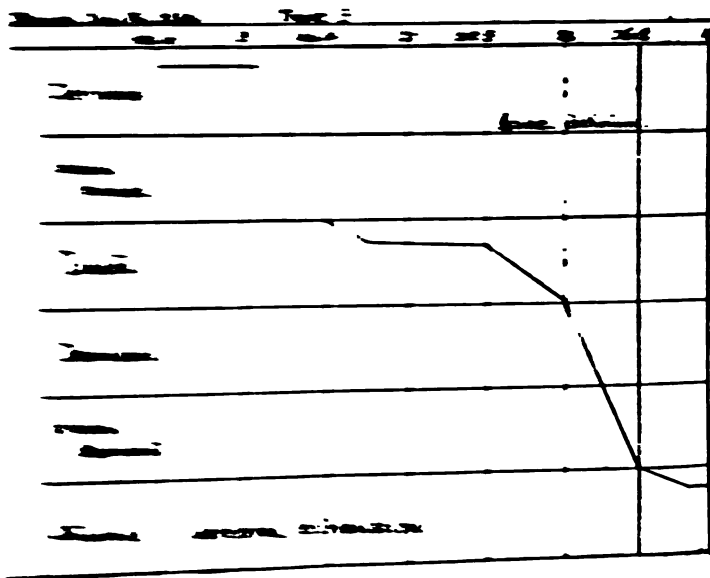
On first administration of thyroid extract condition was about as last noted. Oct. 7th. Treatment inaugurated by the administration of five grains three times a day. Oct. 11th. Until to-day no change noticed in mental condition. Answered direct questions promptly for first time in several months. Pulse accelerated and temperature elevated. Oct. 14th. Agitated and noisy; subject to much motor activity. Thyroid increased to ten grains. Oct. 15th. Refused to stay in bed and danced about ward, singing, laughing and shouting. Would occasionally converse with nurses. Pulse accelerated and temperature elevated $1\frac{1}{2}$ degrees. Oct. 18th. Continues excited, mischievous and emotionally unstable; filthy habits have ceased and now takes food voluntarily. Appears more appreciative and observing. Oct. 21st. Thyroid was discontinued to note effect on bodily nutrition. Oct. 28th. In six days during which he did not take treatment he gained 14 pounds in weight. Yesterday appeared to be getting more depressed and seemed to be relapsing into his former state. Thyroid was re-administered in ten grain doses. While treatment was discontinued temperature remained normal, but pulse

Babcock. Case No. 2191 = Chart 4



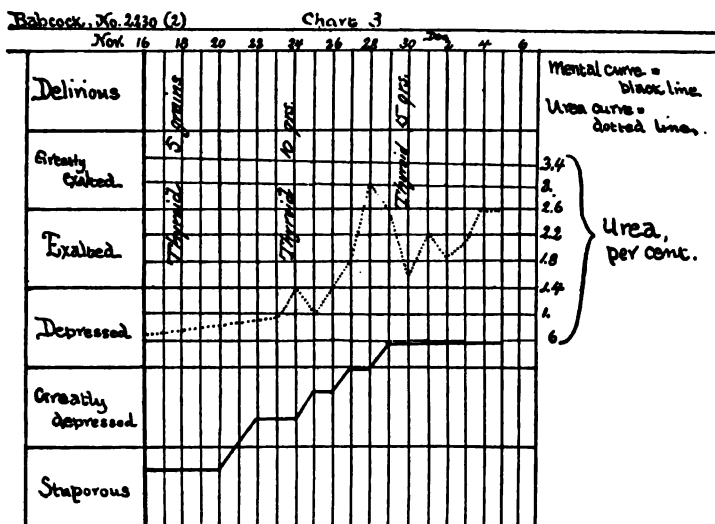
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continued to be accelerated. Nov. 6th. Thyroid increased to fifteen grains. Steadier, brighter and less emotional than formerly. Nov. 11th. Talking quite rationally and reading light literature every day. Nov. 15th. Continues to improve; cheerful and fairly industrious. Nov. 18th. Attended chapel exercises yesterday and seemed to



... grains three times a day. Patient has now been under treatment fifteen days and markedly improved both mentally and physically. She is now talking rationally, appears free from all delusions and seems to be slowly recovering. An endeavor was made in this case to obtain an approximate record of the excretion of nitrogenous compounds. The amount of urea excreted by the urine gradually increased from the first day of treatment. By a reference to chart it will be seen that the mental curve was accompanied in its upward ascent by a rapid increase in the elimination of urea. The day previous to commencing thyroid treatment she excreted but seven-tenths of one per cent. This gradually increased from day to day, under treatment, until the twelfth day when she excreted two and six-tenths per cent. Her daily excretion has since approximated the normal amount.

In this case recovery would probably have occurred without any aid from thyroid or anything else, but it would have been very much delayed and convalescence tedious. Thyroid was given to hasten convalescence and decrease the period of patient's residence in the hospital. Although the case is still under treatment and as yet by no means recovered, appearances indicate that a good recovery is near at hand and we think the treatment will accomplish the object sought.



CASE No. 2257.—J. V., female; admitted September 14, 1895; sub-acute melancholia; age, 57; single; housekeeper; native of New York. Has manifested both homicidal and suicidal tendencies; is regular in her habits, having used liquor to excess at intervals. Family history very defective; father and two paternal uncles insane at some period of their lives. Duration previous to admission four months. Heredity, domestic and financial troubles alleged as causes of her mental disorder. Symptoms previous to admission had been stationary for four months and attack was characterized by varying delusions, mostly of persecutory nature, accompanied with marked depression, occasional agitation and frequent emotional outbursts. On admission was quiet and dull, appeared confused and answered but few questions, apparently unable to exert herself mentally to any extent.

On first administration of thyroid extract her condition had not materially changed since admission. Exhibited moderate degree of depression with possibilities of incipient dementia, the latter rendered more probable on account of her defective family history and irregular

habits. Oct. 11th. Treatment commenced by administration of five grains of extract three times a day. Physical examination revealed sluggish reflexes and diminished sensibility, Oct. 13th. No essential change. Complaints of cephalalgia and feeling of drowsiness and apprehension. Oct. 14th. Less confused and agitated. More cheerful; appetite improved. Oct. 15th. Thyroid increased to ten grains. Oct. 16th. Continues to improve; less confused and entirely free from agitation. Looks brighter; acts more cheerful and from a state of complete indolence has suddenly become industrious and anxious to work. Eating and sleeping well and delusions appear to be slowly disappearing. Oct. 18th. Continues as last noted. Has become irritable and somewhat disagreeable towards other patients. Complaints of nausea but does not show any greater evidence of gastric disturbance. Oct. 24th. Improvement slow but steady. Continues to work in a fairly cheerful and contented manner. Oct. 28th. Temperature accelerated during past few days but pulse has not noticeably increased in frequency. Still complains of pains in head and limbs and has lost some weight. Oct. 29th. Thyroid increased to fifteen grains. Nov. 1st. Patient doing nicely. Sleeping and eating well and appears free from delusions; exhibits less confusion than formerly and is cheerful and industrious. Nov. 11th. Treatment discontinued. Period of treatment thirty-five days. Patient remains about the same as last noted. Nov. 15th. Since thyroid was stopped has become steadier and exhibits greater self-control.

While this case has by no means recovered she has so manifestly improved that the results have been extremely encouraging. She still exhibits some mental instability and is occasionally irritable. Appears to be free from delusions and depression has given way to a uniform state of contentment and cheerfulness. We consider the final outcome of this case to be yet in doubt.

CASE No. 2304.—M. J. M., female; admitted October 31, 1895; sub-acute melancholia; age, 38; single; housekeeper; native of New York. Habits good. Family history negative. Attempted suicide by jumping into bonfire. Three years previous to admission had attack of la grippe following which she was emotionally unstable, but showed no further evidence of mental disorder until one year later when she had a second and prolonged attack which left her a mental wreck. During last February she became agitated and delusional and has since continued to be excited at frequent intervals. On admission patient was quiet, reticent and depressed, conversing only in whispered monosyllables. Following admission she became agitated and her depression deepened.

The administration of thyroid extract was commenced Nov. 14th by the exhibition of five grains three times a day. Nov. 16th. Pulse slightly accelerated; temperature normal. Mental condition unchanged. Nov. 17th. Pulse ranges between 100 and 102; temperature

normal. Nov. 20th. Pulse ranges from 110 to 120; somewhat irregular. Patient is restless, apprehensive and worried. Nov. 23d. Pulse greatly accelerated, ranging between 115 and 126. Temperature elevated one degree. Nov. 25th. Restless and confused; reticent; follows nurses about ward and attempts to imitate their movements and speech. Thyroid increased to seven grains. Nov. 27th. Brighter and more cheerful; less restless and more appreciative of her surroundings. Nov. 29th. Thyroid increased to ten grains. Dec. 1st. Slight improvement manifest; wrote legible and coherent letter to sister; attended chapel exercises. Losing weight. Still under treatment.

Table No. 1 gives in condensed form a summary of the principal personal and clinical data of each case. The results of treatment in the thirteen cases are, briefly, as follows:—Two recovered; a case each of melancholia and mania. Seven improved, of whom two will probably recover; five cases of melancholia and two of mania. Four cases underwent no change; two cases each of mania and melancholia, all of whom were undoubtedly demented, to some extent, when treatment was inaugurated.

While the mental improvement, in suitable cases, dates from the first rise of temperature, the greatest improvement accompanies the gradual subsidence by lysis of the febrile reaction. As a general rule the higher the temperature during treatment, the greater the mental reaction following its fall, and the more marked convalescence thereby established. When temperature subsides and continues normal for forty-eight hours the thyroid should be stopped and general therapeutic measures substituted. Much harm may be done if treatment is prolonged beyond this stage. Hydrotherapy, static electricity and massage will now be indicated in most cases and found useful to promote convalescence.

The rapid loss of weight ceases with the last dose of thyroid and during convalescence the assimilative and nutritive processes, highly stimulated but held in abeyance during active treatment, rapidly rebuild the wasted tissues. The voracious appetite, improved color and rapid gain in weight, all betoken great activity of cell-nutrition and in most cases are accompanied by an improved mental condition.

The gain in body weight following thyroid treatment is

TABLE NO. 1.—THYROID TREATMENT.

SUMMARY OF THIRTEEN CASES.

Case No.	Age.	Under Treatment.		Gain Weight two Weeks after Treatment.	Diagnosis on Admission.	Condition when Treatment was Inaugurated.	Duration Previous to Treatment.	Maximum Dose.	Maximum Temperature.	Result.	Remarks.
		Period.	Changes in Weight.								
1783	23	30 days	- 7	23 lbs.	Acute Mania.	Attack prolonged. Cerebral exhaustion.	15 Mos.	12 grs.	108°	Improved.	Will probably recover.
1807	38	24 "	- 2	11 "	Stuporous Melancholia.		13 "	10 "	100.2°	Greatly improved.	Second attack.
1841	41	30 "	- 8	6 "	Acute Mania. Recurrent.	Attack prolonged.	12 "	15 "	100°	Recovered.	Second attack. Discharged 28 Nov., '95.
1878	37	15 "	- 1- 1	0 "	Acute Mania.	Organic Dementia.	10 "	15 "	101.4°	No change.	Probably specific origin.
1931	32	31 "	- 3	7 "	Acute Melancholia.	?	15 "	10 "	99.8°	Improved.	Slightly demented.
1948	25	18 "	- 13	16 "	Acute Melancholia.	Stuporous.	11 "	15 "	99.8°	Improved.	Still convalescing.
1982	33	15 "	....	....	Acute Melancholia.	?	19 "	10 "	.....	No change.	Delusions fixed.
2005	32	7 "	....	....	Sub-acute Mania.	Same.	8 "	10 "	98°	No change.	Escaped.
2174	22	28 "	- 6	8 lbs.	Stuporous Melancholia.	Stuporous.	11 "	10 "	100°	No change.	Evidently demented.
2191	19	41 "	- 9	13 "	Stuporous Melancholia.	Post-Melan. Hebetude.	5 "	15 "	101.2°	Recovered.	Still in hospital awaiting removal home.
2230	39	.....	Lost.	....	Acute Delirium.	Cerebral exhaustion.	3 "	.....	.....	Improving.	Still under treatment.
2257	57	31 days	- 4	1 lb.	Sub-acute Melancholia.	Same.	5 "	15 grs.	99.5°	Improved.	Slightly demented.
2304	26	.....	Lost.	....	Acute Melancholia.	?	25 "	.....	.....	Improving.	Still under treatment.

very rapid. Within two weeks after the administration of the last dose most cases gained anywhere from six to twenty pounds. (See table No. 1). During course of treatment in one case thyroid was stopped for five days and patient gained thirteen pounds, as will be seen by noting the weight curve of case No. 2191.

We started out with three main objects in view, the first of which was to ascertain as nearly as possible the correct physiological action of thyroid extract. It is notoriously difficult to obtain reliable subjective symptoms from the insane, as in many cases they only represent whimsical or hypochondriacal ideas of the patient. They are therefore eliminated and only verified statements, based on recorded clinical observations of thirteen cases, appear in the following account of its physiological action.

Circulation.—Blood: In case No. 1783, the percentage of hæmoglobin increased from 63 to 86 per cent. No. 1807 increased 20 per cent, while several others showed a like increase. In three cases the number of red blood cells increased over a million per cubic millimeter. Several others gave a marked increase.

In the majority of cases arterial tension was increased. In a smaller number, notably cases of mania, blood pressure was diminished. Precordial oppression as pointed out by Meltzer* occurred in a few cases.

Respiration.—In present series of thirteen cases the respiration was not especially influenced. Cases whose pulse rate ranged from 110 to 130 showed little respiratory acceleration or difficulty.

Temperature.—Elevated from one to three degrees in the majority of cases. (See chart No. 1). In typical cases the temperature curve resembles a typhoid temperature of moderate height, ascending in gradual steps, and subsiding by lysis. In one case (2005, see chart), the temperature was subnormal ranging from 95.6° to 98° throughout entire course of treatment.

Muscular system.—Myasthenia pronounced in most cases at an early period of treatment. Flaccidity, tremor and

* Meltzer on Thyroid Therapy. N. Y. Med. Jour., May 25, 1895.

general weakness characterized these cases. In case No. 1783 dynamometer registered 42 previous to exhibition of thyroid and 28 after a week's treatment. Case No. 2230 manifested even a greater loss of strength, dynamometer registering 54 before and 22 after treatment had been well inaugurated.

Nervous system—(1.) *Cerebral*: Early development of a feeling of apprehension together with some mental and much motor restlessness. At first an apparent sense of fatigue with great mental oppression followed by a gradual clearing up of the cerebral processes and improved mental coördination.

(2.) *Spinal*: Reflexes varied. In the majority of cases they were increased and exaggerated from an early period of the treatment. In two cases the patellar response remained sluggish.

(3.) *Peripheral*: *Special Senses*: No accurate observations were made.

General Sensibility.—At the outset æsthesiometer revealed more or less anæsthesia in nine cases while the balance were apparently normal. In four of the nine anæsthetic cases sensibility gradually returned to normal as the mental condition improved. The other five cases were all more or less improved, two of them becoming hyperæsthetic.

Secretion.—Diuresis well-marked in many cases as noted by Vermehren.* Perspiration was decreased; skin became dry and scaly and desquamation occurred in a few cases.

Digestive system.—Nothing definite was ascertained regarding the influence of thyroid on digestion. Slight gastric distress followed the exhibition of even small doses while ten grains in a few and fifteen grains in all cases caused great irritability of the stomach, accompanied by nausea and in many instances vomiting. In about twenty per cent of cases the tongue was coated, the teeth covered with sordes while the mouth remained dry and parched.

Skin.—Urticiform eruption accompanied by severe itch-

* Vermehren: Essay on thyroid in myxœdema. Univer. Med. Jour., Nov., 1895.

ing, followed by scaling and desquamation, was observed in two cases.

When we come to consider just how thyroid promotes recovery in certain forms of mental disease we are face to face with a problem difficult of solution. True, we can say, in a general way that it modifies perverted cell-nutrition; that it increases tissue metabolism and rids the system of noxious products, but so do many other therapeutic agencies.

Cerebral and spinal stimulation: In considering the special action of thyroid we first endeavor to ascertain its power as a cerebral stimulant. Motor restlessness was an early symptom in several cases of melancholia and acute stupor that had never exhibited the symptom previous to inauguration of treatment. It usually became manifest on the third day and accompanied the first rise of temperature. In their incipency these motor symptoms were purposeless and without design but as self-control developed they gradually came under voluntary guidance. The motor manifestations therefore point to cortical stimulations as an early result of the action of thyroid on the brain. Bruce, (*loc cit.*) cites a case which corroborates this assertion.

Coexistent with the development of the cerebral symptoms, the spinal reflexes are found to be exaggerated. This stimulation of the anterior spinal nerve cells is not constant but occurs in the majority of cases. Closely related to cerebral stimulation is the question of circulatory changes. As in many cases thyroid is a decided vaso-motor stimulant, it is evident that the improved blood supply becomes an important factor in improving the general nutrition. Not only are the cortical and spinal cells benefited, but the nutritive processes in general are greatly augmented. Railton* cites a case of sporadic cretinism treated with thyroid who gained four inches in height; several pounds in weight and underwent corresponding mental improvement in the short space of ten months. The marked increase in weight of almost every case in table No. 1 is further evidence that the increase of metabolism is general and not local.

* Railton: Sporadic Cretinism treated with thyroid gland. Br. Med. Jour., No. 1744.

Elimination of nitrogenous compounds—The elimination of the products of retrograde metamorphosis is greatly increased. Our observations were limited to the quantitative estimation of the excretion of urea in four cases. The results obtained were fairly uniform and drew our attention to tissue-metabolism in cases of acute delirium and acute stupor. It is well known that a certain percentage of these cases have a tedious convalescence; that a period of apparent cerebral exhaustion follows the active delirium and the patient appears on the verge of dementia. During this period of mental torpor these patients excrete comparatively little urea. Some cases under observation averaged a daily excretion of six-tenths of one per cent for several weeks—at least two per cent under normal. Increased excretion followed the exhibition of even small doses of the thyroid extract and three of the four cases showed coexistent mental improvement. (1807—2230—2304.) In a case of cerebral exhaustion following acute delirium (2230) the increased excretion of urea accompanied the improved mental condition step by step. This is graphically illustrated by chart No. 3. During the period of increased elimination of nitrogenous products this patient lost weight and strength.

Considered together, the mental improvement, increased elimination of urea and gradual loss of weight show that the katabolic processes were actively excited; that the detritus, so to speak, was thereby removed from the embarrassed sewers of the body; that the exhausted cells burdened with noxious excrementitious products were stimulated into unwonted activity and that the normal elimination of these compounds guarantee, for a time at least, the performance of normal cell-function. Corresponding, though less marked, results were obtained in the two remaining cases.

Owing to the small number of cases studied, these deductions may not carry much weight but they are sufficient, at least, to draw attention to the relation of perverted metabolism to delayed recoveries following acute insanities, as well as to point out the influence that thyroid may exert toward their amelioration.

Our second and third propositions: to determine the class of cases in which thyroid holds out the best prospect of recovery and to apply it therapeutically from physiological deductions, may be jointly considered.

I. Cases of post-melancholic hebetude following a lengthy period of depression, offer the best prospect of improvement and are more or less influenced in the majority of instances.

II. Cases of stuporous melancholia of long duration are usually improved by thyroid. Cases which recover appear to have a special predilection to relapse.

III. Maniacal cases whose attacks have been unduly prolonged give a very encouraging prognosis. Our first recovery occurred in a case of recurrent mania (1841) whose attacks (second) had been unduly prolonged. Recoveries in this class hold no greater prospect of permanency than recoveries without special aid. The attack has simply been cut short by the thyroid, and, other things being equal, a recurrence is more than probable.

IV. Cases of cerebral exhaustion following acute delirium or stupor whose elimination of urea and other nitrogenous compounds is greatly reduced, offer a fair chance of improvement. While the majority of these cases would probably recover without the aid of thyroid their residence in the hospital can be cut short in many instances by its judicious use.

V. Chronic disturbed cases: During the course of our observations we have noticed that many cases of chronic mania without fixed delusions may be benefited by a course of thyroid treatment. In suitable cases their maniacal outbursts may be lessened in intensity; a greater degree of self-control may be obtained and their condition rendered more comfortable in many respects, without injury to their physical health.

VI. In doubtful cases thyroid may assist in clearing up the diagnosis. It will early differentiate between true stupor and dementia. In delusional cases of a doubtful nature a course of treatment will usually show whether delusions are fixed or temporary, as the latter will vary in

character or entirely disappear during treatment, while the former undergo no change whatever. Fixed delusions were demonstrated in Case No. 1982, while they disappeared in all cases which improved or recovered.

Relapses.—It has been noticed by one or two observers, notably MacPhail, (*loc. cit.*) that relapses are especially prone to occur after thyroid recoveries. Our own observations have been too recent to enable us to discuss this point. Granted, that thyroid recoveries do relapse more frequently than recoveries in unassisted cases. Better a few weeks or even days of sanity than an unbroken period of mental vacuity.

AN ANALYSIS OF FORTY CASES OF POST INFLUENZAL INSANITY.

BY RICHARD H. HUTCHINGS, M. D.,
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The following analysis includes all the cases admitted to the hospital since Dec. 10, 1890, whose insanity was attributed to epidemic influenza and whose histories included an account of the initial disease. There were in all 19 men and 21 women.

AGES.—The youngest patient was a man aged 19 years, the oldest a woman aged 83. The average ages were for men 46.4 years, and for women 45.3 years.

TABLE No. 1.

Decades.	1st.	2d.	3d.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	Total.
Men	0	1	2	3	5	5	0	2	1	0	19
Women	0	0	5	3	7	1	2	1	2	0	21
Total	0	1	7	6	12	6	2	3	3	0	40

It will be seen that among the men there was a gradual increase in the number of cases up to the fifth and sixth decades which together include more than half the cases, while among the women there was a sharp outbreak in the third decade, a decline in the fourth and another exacerbation covering one-third of the cases in the fifth decade.

These facts find plausible explanation in the peculiarities of sex and occupation, and are in accord with the onset of insanity from other causes; but a striking fact is, that a large proportion (15%) occurred in persons who had passed the advanced age of seventy years.

HEREDITY.—Heredity was admitted in 5 men and 10 women. There was no hereditary tendency in 11 men and 9 women, and it was uncertain or unascertained in 3 men and 2 women. The percentage of hereditary cases would therefore be 26.8 and 47.6 for men and women respectively.

DIAGNOSIS.—Melancholia occurred in the cases of 13 women and 5 men, mania in 4 women and 5 men, dementia in 3 women and 3 men, and 4 men and 1 woman were affected with general paralysis. Forty-five per cent of the cases were therefore melancholia. The records of the hospital show that during the same period the percentage of melancholia to all admissions was only 21 per cent. The tendency to depression was a marked characteristic in many of the cases of this series, and it could be detected in some that were classed as mania because of the predominance of maniacal symptoms. The vague, ill defined sense of fear and impending calamity would, in some individuals, cause acts of violence and excitement and efforts to escape from imaginary enemies. The following case illustrates this point:

CASE No. 841.—Male, 50 years of age; farmer. First attack. Duration, 5 months. His insanity dated from an attack of "Grippe and Pneumonia" which occurred five months previously. The following facts were stated in his certificate: "He said his family were all against him. A dog was determined to attack him and he wanted protection. He talked constantly until he was exhausted. He has threatened to kill his son with an axe and says he will get a Winchester rifle to protect himself. He wanted to telegraph the Governor for militia to protect him from a dog."

The diagnosis in this case was mania and his condition was maniacal, but all his delusions centered about the idea of personal danger and he was suspicious and inclined to make assaults. True melancholia, however, occurred with the greatest frequency; it ranged through every degree of

depression and existed both with and without delusions. The following case may be taken as a type of this class and for that reason merits more detailed mention:

CASE No. 1031.—Woman, aged 23, married, housewife. Diagnosis: Acute melancholia. Duration, one month. "She had an attack of epidemic influenza in March, 1892, and afterwards appeared debilitated and nervous. In November following she was frightened and an abortion at the third month occurred. Her general health continued poor and in May, one month before admission, she became melancholy and has since rapidly grown worse. She has been restless, insomniac and apprehensive. She has been afraid of some ill-defined harm and is timid and incoherent and has manifested religious enthusiasm. She has been under medical treatment but has failed in weight and strength." The examining physicians stated that she was agitated, emotional, and repeated incoherent phrases many times over. On admission the patient was timid and apprehensive, she talked in the manner described in the certificate and held an open prayer-book in her hand. For a few moments her attention could be attracted and she talked rationally and intelligently and then relapsed into the previous state. She was emaciated. She continued with periods of great restlessness alternating with periods of quiet. Her appetite was poor and she occasionally refused food and medicine. One month after admission there were indications of general improvement, her appetite and strength improved under treatment by rest in bed combined with electricity and over-feeding and she gradually became cheerful and composed. She was discharged recovered three months after admission. During her residence in the hospital she expressed no delusions and could give no reason for her depression and agitation.

NO. OF ATTACK.—Eighteen men were in the first attack, one was a second attack; 17 women were in the first attack, 3 in the second and one in the third.

RESULT.—Among the men 6 recovered, 4 were improved, 3 died, 2 were discharged unimproved and 3 remain under treatment and are chronic. Of the women 8 recovered, 3 were improved, 2 were discharged unimproved, 3 died and 5 remain under treatment who were chronic at the time of admission. To facilitate comparison of the two positive classes into which the cases naturally group themselves, viz., the recovered and the unimproved, Table No. 3 has been prepared which shows in detail on one side those who recovered and on the other those who were unimproved by a reasonable period of treatment which has been arbitrarily placed at two months or more.

TABLE No. 2.
RECOVERIES.

Sex.	Age.	Heredity.	Diagnosis.	Period of Treatment.
M.	51	No.	Ac. Mel.	6 weeks.
M.	19	Yes.	S. A. Mel.	9 weeks.
M.	42	No.	Ac. Mel.	10 months.
M.	55	No.	Ac. Man.	4½ months.
M.	26	Collat	Ac. Man.	11 months.
M.	46	Collat.	S. A. Man.	6 weeks.
F.	46	Sister.	S. A. Mel.	7 weeks.
F.	30	No.	Ac. Man.	4 months.
F.	23	Sister.	Ac. Mel.	2½ months.
F.	48	Uncle.	Ac. Mel.	4 months.
F.	43	Yes.	Ac. Man.	3 weeks.
F.	33	No.	Ac. Mel.	3 months.
F.	26	No.	Ac. Man.	5 months.
F.	49	Yes.	S. A. Mel.	2½ months.

UNIMPROVED.

Sex.	Age.	Heredity.	Diagnosis.
M.	42	No.	Dementia.
M.	74	Unknown.	Sub-acute Melancholia.
M.	27	Unknown.	Imbecility.
M.	36	No.	Gen. Paralysis.
M.	52	Yes.	Gen. Paralysis.*
M.	82	No.	Senile Dementia.
M.	36	No.	Terminal Dementia.*
F.	61	Yes.	Chronic Melancholia.
F.	80	Yes.	Acute Senile Melancholia.*
F.	72	No.	Senile Dementia.
F.	41	Yes.	Gen Paralysis.*
F.	61	No.	Chronic Melancholia.
F.	24	Yes.	Terminal Dementia.
F.	28	Unknown.	Chronic Mania.

* Died.

It will be seen by this table that age is an important element in the prognosis. The oldest person to recover was fifty-five years of age, the next oldest was fifty-one; the average age of those who recovered was forty-two years. Of this group eight were hereditary. Recovery was rapid as a rule: one recovered in three weeks, two in six weeks; the average residence in the hospital was four months. As regards the variety of insanity, mania and melancholia were the only cases to recover and of the two mania appears to be much the more curable. Of the nine cases of mania originally admitted six are found in the table of recoveries (66

per cent), while of the eighteen cases of melancholia only eight recovered (44 per cent). These figures can only express the whole truth when observed in connection with the cases detailed in the second half of this table, which shows why at least a few of them did not improve. There it will be seen that one case of mania and two of melancholia were diagnosed as chronic upon admission. Another of melancholia occurred in a woman eighty years of age and was complicated by advanced senility. Incurable forms of disease—general paralysis and dementia—cover eight of the remaining cases. After these exceptions are made it remains that the percentage of recoveries stands at about the same ratio as average recoveries to the total admissions (thirty-five per cent of this series have been discharged recovered), but when compared with psychoses following other acute infectious diseases, the outlook for post-influenzal cases appears less favorable.

Influenza seems to have the power in some cases of lighting up delusions that have long been obscured by a mild dementia. One case of this series had an attack of puerperal insanity in 1853 and was treated in an asylum one year. She effected her escape and was permitted to remain at home where she was recognized as mildly demented, but lived comfortably as a member of the family. After an attack of influenza in 1892 she became depressed, agitated and actively suicidal. She has continued in this condition and is one of the most pitiful cases in the hospital.

The effect of influenza on one case of imbecility is worthy of notice. This lad (Case No. 2065) after an attack of influenza changed markedly in his mental peculiarities. He developed delusions of persecution, imagined men were in pursuit of him and after admission to the hospital became rapidly demented. Such effects as these on chronic and defective patients, were not observed to follow the epidemics of influenza that have prevailed in the hospital from time to time. They are probably due to exposure and want of care during the sickness or before convalescence was complete. One case (No. 544) was attributed to exposure while sick and lack of care after influenza. The tendency of this

disease to linger in the form of debility for days or weeks after the acute symptoms have disappeared is well known and many sufferers are compelled by circumstances to return to their household cares, or to the exposure attending their daily occupations, when they are in need of rest and warmth. Add to this the direct influence of the toxins of influenza upon nervous structures as has been shown by Althaus*, and we have an etiological factor of the first importance. Even a superficial examination of these cases, which are summarized in Table 4, will show that the insanity of influenza is a psychosis, having as its basis a deterioration of physical health; and its prevention by appropriate measures during and following the febrile period should be diligently sought by every practitioner.

It would appear from results shown herewith, that the brain and nerve exhaustion should be anticipated in every case of influenza, and where the antecedents lead to the belief of pre-existing instability, no means should be left untried to put the patient in the way of counteracting the vital depression that follows this disease.

* British Medical Journal 1893, Vol. I, page. 180.

TABLE No. 3.

No.	Sex.	Age.	Heredity.	Diagnosis.	No. of Attack	Result.	Period of Treatment	Symptoms appeared after Grippe.	General Course and Remarks.
2270	M.	42	No.	Dementia.	1	Here.	2 mos.	At once.	Stuporous.
2185	M.	51	No.	Ac. Mel.	1	Rec.	6 weeks.	6 weeks.	Impulse to suicide; rational; rapid recovery.
1998	M.	53	Sister.	Ac. Mel.	1	Unimp.	2 mos.	.....	Profoundly depressed; no delusion; removed.
2050	M.	74	Not stated.	S. A. Mel.	1	Chronicity	Remains.	?	Now demented.
2045	M.	27	Not stated.	Imbecility	1	Chronicity	.....	1 year.	Thought people were trying to kill him; became dem.
1748	M.	36	No.	G. P.	1	Chronicity	.....	6 mos.	Syphilis also alleged.
1844	M.	19	Gt. Gr. Mo. and Collat.	S. A. Man.	1	Recovered	9 weeks.	4 mos.	Depression began with influenza; rational.
1866	M.	52	Mother.	G. P.	1	Died.	1½ mos.	At once.	2 years ago had grippe; gradual mental failure began.
1928	M.	42	No.	A. Mel.	1	Rec.	to mos.	.....	Suspicious of wife; believed he had committed crime.
1621	M.	82	No.	Dem.	1	Unimp.	4 mos.	At once.	4 years ago had grippe; acted strangely; grew worse.
1053	M.	55	No.	Ac. Man.	1	Rec.	4½ mos.	?	Suspicious; feared murder; improved steadily.
1097	M.	73	No.	Sen. D.	2	Imp.	11 mos.	.....	Delusions of grandeur; improved.
1126	M.	26	Collateral.	Ac. Man.	1	Rec.	5 mos.	.....	Gradual recovery; occasionally excited.
1165	M.	36	No.	Dem.	1	Died.	5½ mos.	At once.	Hypochondriacal; died of pneumonia.
841	M.	53	None.	S. A. Man.	1	Imp.	7½ mos.	At once.	Thought people against him; wanted protection.
630	M.	41	Unknown.	G. P.	1	Died.	10 mos.	At once.	Slow recovery from grippe; confused and visionary at same time; suicidal; homicide threatened.
650	M.	42	None.	G. P.	1	Imp.	6 weeks.	At once.	Gradual mental confusion after grippe; discharged in a remission.
781	M.	46	Collateral.	S. A. Man.	1	Rec.	6 weeks.	At once.	Depressed; sleep irregular; recovered rapidly.

TABLE No. 3—(Continued).

No.	Sex.	Age	Heredity	Diagnosis.	No. of Attack	Result.	Period of Treatment	Symptoms appeared after Grippe.	General Course and Remarks.
2304	F.	26	No.	Mel.	1	Remain'g.	Here, Ch.	At once.	1st Grippe 3 yrs. ago; depressed; and, 2 yrs. ago; insane.
1954	F.	40	No.	S. A. Mel.	1	Unimp.	1 week.	At once.	Fear of death; rational.
2202	F.	61	Collateral.	Ch. Mel.	1	Remain'g.	Chronic.	1 mo. after measles.	Grippe in May; measles in June; then suspicious; delusions of watching.
2216	F.	53	No.	Acute Mel.	1	Imp.	7 weeks.	Soon.	Delusion of great sin; improved slowly; removed.
1731	F.	80	Collateral.	Acute Mel.	1	Died.	15 months.	2 months of ill health.	Persecution and fear of injury; no improvement; rupture, heart.
1732	F.	83	Pat.	Sen. Dem.	1	Died.	5 months.	A few mos.	Mildly demented 1 year hastened by grippe; died of debility.
1755	F.	46	Sister.	S. A. Mel.	2	Rec.	7 weeks.	18 months.	Not well since grippe; depressed; sleepless; confused.*
1923	F.	30	No.	Ac. Man.	1	Rec.	4 months.	At once.	Depressed; things going wrong; later violent.*
1592	F.	46	No.	Ac. Mel.	3	Imp.	7 months.	At once.	Overdose of acetanilide; unpardonable sin; improved slightly.
953	F.	72	No.	Sen Dem.	1	Remain'g.	Chronic.	At once.	Active delusions of poisons and witches.
1017	F.	41	Aunt.	G. P.	1	Died.	3 y. 3½ m.	At once.	Syphilis; mildly demented after grippe; died of G. P.
1031	F.	23	Sister.	A. Mel.	1	Rec.	2½ mos.	1 year.	Poor health followed grippe; miscarriage 6 months later; continued poor; deluded 1 month.
1004	F.	48	Uncle.	A. Mel.	1	Rec.	4 months.	3 months.	Poor health followed grippe; delusions; attempted suicide
804	F.	67	None.	Ch. Mel. fol. Dem.	2 (?)	Remain'g.	Here.	At once.	Mild dementia, 40 years; melancholia followed grippe; delusion of contamination.
854	F.	24	Uncle.	Dem.	1	Unimp.	Here.	At once.	Grippe, 2½ years ago followed by change of character; demented.
870	F.	34	Unknown.	Ac. Mel.	2	Imp.	9 months.	At once.	Melancholy; grew better; relapse; mutilation; religious; rational.
541	F.	43	Mother.	Ac. Man.	1	Rec.	3 weeks.	At once.	Grippe with high fever and prostration, 1 week, then grew talkative and gradually violent.*
544	F.	28	Unknown.	Ch. Man.	1	Remain'g.	.....	At once.	Poor health when attacked by grippe; exposure while sick; lack of care and want after; chronic.
578	F.	26	None.	Ac. Man.	1	Rec.	3 months.	10 days.	Put to bed; paroxysms; gradual recovery.
590	F.	33	None.	Ac. Mel.	1	Rec.	3 months.	At once.	Gradual recovery; readmitted.
365	F.	49	Mother and brother.	S. A. Mel.	1	Rec.	2½ mos.	2 years.	Ill health preceded and followed grippe; vague fears; bewitched.

*Readmissions.

A CASE OF MORAL INSANITY.

REPORTED BY WARREN L. BABCOCK, M. D.,
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CASE No. 1952.—F. C., female; age, 31; single; native of New York; habits good; tendencies, destructive and criminal in character. As an infant she was peculiar and early gave indications of mental unsoundness, especially after an attack of scarlet fever when about two years of age

The first marked evidence of unsound mental condition followed a prostration during childhood, caused by the use of nitrous oxide gas during a dental operation. The parents attribute her early symptoms to the latter agency, but they were more likely precipitated by a sunstroke, which occurred about that time.

Family history doubtful. No direct evidence of insanity in the family could be ascertained, but it was learned that both parents were of neurotic temperament. A close study of her history led me to believe that she was a congenital degenerate and a recent study of her subjective symptoms, particularly the stigmata revealed by a physical examination, has more than confirmed the original diagnosis.

During childhood she was eccentric and unruly, markedly disobedient, perverse in her tastes, irritable on slight provocation, and when angered would fly into a passion, become destructive and greatly disturbed. This would soon pass away, but it was noticed as the child grew older she became worse, less susceptible to control and developed sundry degenerate traits of character. From father's statement it seems that the girl reached the age of eighteen without very serious trouble, maintaining fair self-control with only an occasional manifestation of viciousness. At the latter age, however, she had a serious outbreak and for several weeks lost entire control of her mischievous and perverse tendencies. This was followed by a somewhat tumultuous interval of four years at the end of which she again had an outbreak extending over a like period of time. The history of these two early outbreaks is somewhat meagre, but enough has been learned to show that they necessitated confinement and seclusion at home. As near as can be ascertained she did not express delusions, was very timid and apprehensive, had a horror of sleeping alone in a room with the door locked, threatened her parents with a knife, broke dishes and furniture and was a menace to the safety of the family except when in the presence of her father. He alone seemed to command respect and with little difficulty controlled her mischievous tendencies.

The absence of all evidence of self-restraint, the exhibition of the lower instructive elements of her character and the gross perversion of her moral faculties especially mark these earlier attacks and engrafted upon her nature vicious and perverted tendencies which, during her

latter attacks, have increased in degree and complexity until they now approximate well-defined criminal traits.

The period of comparative lucidity or, more properly, remission, which followed this second outbreak much resembled that following her former disturbance, except that it extended over a shorter period or somewhat less than two years. During this outbreak she became entirely unmanageable, even by her father, and was sent to the St. Lawrence State Hospital for treatment. A fairly complete history of the case was obtained, but many of the above facts have since been ascertained from the father.

She was first admitted under date of Sept. 9, 1891, and remained in the hospital six months, at the end of which time she had greatly improved and gained fair control of her perverse traits. At the earnest solicitation of her father she was discharged March 1, 1893.

Throughout the earlier months of her first residence in the hospital she was subject to paroxysms of fury and destructiveness, during which she was mischievous, vicious and subject to great mental restlessness. During one of these she seized a bottle of camphor and chloral liniment from a nurse and drank a portion without subsequent injury. She repented of her rash act immediately afterwards and regretted that she was unable to control her impulses. She remained disturbed and excited for four months and then began to improve rapidly, becoming quiet, orderly and finally manifesting few contrary tendencies.

Second admission (fourth outbreak) was on March 15th, 1895, after an interval of three years. During this period she was turbulent and mischievous but maintained fair control. Her second residence in the hospital was manifested by a repetition of her former offences. If anything, her present attack is marked by an increase in vicious and destructive tendencies. Some of her mischievous acts seem to be premeditated, while others have the appearance of being entirely impulsive. She will emphatically deny all of her behavior which is unobserved but readily traced to her as the author. When discovered in any of her depredations, she acknowledges her guilt with profuse regrets and promises to restrain herself in the future, but, nevertheless, will take the first opportunity and from time to time assault fellow patients slyly when nurses are not looking. One minute she will talk sociably and kindly with an associate, while the next, if unobserved or if converser's attention is distracted, she will strike a violent blow with anything which may be at hand to inflict injury.

It has been necessary to keep her throughout the day on a chair in the middle of the day-room where she can be under the constant observation of the nurses. Two months after admission she became steady and more orderly and was transferred to a convalescent ward where she assisted in light ward work and sewing. She appeared contented and cheerful, seemed to realize that she was improving

and was proud of the fact. After three months of quiet and orderly behavior she suddenly, without provocation, recommenced her depredations and treacherous behavior. She was again transferred to a disturbed ward where she now continues destructive, mischievous and vicious. On one occasion recently she awaited her opportunity and escaped by jumping from a dining-room window, a distance of six or eight feet, to the ground and then made her way to the river. She was closely followed and returned without resistance. Her impulses have continued uncontrollable and her behavior violent for several weeks until the present writing, (October, 1895).

Following her attacks and during her periods of comparative rationality she manifests many evidences of psychical degeneration which are usually under fair control. These consist of mild obsessions and impulsions and short periods of irritability and restlessness accompanied with much obstinacy and some loss of self-control. During an outbreak and perhaps following an assault, she will talk rationally about her condition and apparently seems to appreciate the fact that she has poor control of her impulsions. These obsessions probably encounter some resistance from her volitional faculties, resulting in a chaotic mental tumult, denominated a paroxysmal attack by Régis, during which the acts are committed. This is evinced by worry and hesitation preceding the impulse and complete subsidence of the paroxysm immediately after the obsessional command is carried out. On various occasions following a paroxysm she has insisted that she restrained herself as long as possible. Owing to a pronounced degree of deafness, a sequel to the attack of scarlet fever in infancy, it is with extreme difficulty that she can be conversed with. As far as can be ascertained she is not controlled by hallucinations or persecutory delusions, as she seems to appreciate the enormity of her offences and regrets her lack of self-control. Owing to the early development of her psychosis she has not had the benefit of an education and is comparatively ignorant but has learned to read and write. It is impossible to determine the exact extent of her intellectual alienation, but it is evident from the history of her case and her condition during remissions, as well as symptoms throughout the outbreak, that she suffers a mild degree of intellectual impairment. From the mildness of her outbreaks in childhood, the steady increase and enormity of her offences and progressive loss of will power or self-control it would appear that her disorder was primarily emotional and that her volitional and intellectual faculties were secondarily involved. While the history of her case is that of a congenital degenerate there is no evidence to show that there was any intellectual deterioration until after her attack of sunstroke in childhood.

She is a confirmed kleptomaniac and exhibits a high degree of secretiveness following her offences. She is also a pyromaniac, having on one occasion set fire to her father's residence.



Case No. 1952.

A prominent symptom and one which has influenced treatment to some extent is a morbid fear of confined or closed spaces (claustrophobia). She has a horror of seclusion in a dark room, and a reminder that such a course of procedure would be probable if she did not endeavor to control herself will usually delay an outburst for several hours or even days.

A physical examination with anthropometrical measurements was recently made during a short remission in her present outbreak with the following results:

- Skeleton.** (a) Height, 163 centimetres.
 (b) Development. Apparently immature with evidence of retardation at an early age. Shoulder girdle asymmetrical with a slant of 15 to the left so that the right shoulder is noticeably elevated when standing or walking.
- Cranium** Head dolichocephalic; right temporal protuberance very prominent; occipital protuberance enlarged.
 Diameters. Antero-posterior 19.5 centimetres.
 Transverse, 16 "
 Circumference, 59.5 "
 Cephalic Index, 82.5
- Face.** Mento-frontal diameter, 19.5 centimetres.
 Bizygomatic " 13 "
 Facial Index, 66 $\frac{2}{3}$
 Forehead—Superciliary ridges enlarged and brows overhanging.
 Nose—Deflected to left slightly.
 Eyes—Close together and slightly divergent.
- Thorax.** Paralytic in shape; retracted above and below clavicles and in intercostal spaces.
 Circumference. During inspiration, 74.5.
 During expiration, 73
 (a) Clavicles. Acromial convexity of right clavicle increased posteriorly. Prominent exostoses on anterior surface of sternal end of R. clavicle. (No history of fracture).
 (b) Sternum. Manubrium prominent. Lower half of sternum deeply depressed making a prominent angle at junction of manubrium and gladiolus.
 (c) Ribs. Contour fairly normal. Epigastric angle very acute.
- Pelvis.** Circumference at crest, 82.5 centimetres.
 Transverse diameter (a) Interiliac, 31 centimetres.
 (b) Interspirious, 29.5 centimetres.
- Limbs.** Neither upper nor lower limbs present any noticeable abnormalities and are of proportionate length. Hands and fingers well formed and symmetrical.

- Functional Reflexes.** Patellar, greatly exaggerated.
Pupillary, react sluggishly to light.
Tricipital response obtained with difficulty.
Skin, normal.
- Special Senses.** (1) Sight, moderate degree of myopia.
(2) Hearing, complete deafness in left ear and hears only loudest noises in right.
(3) Other senses normal
- General Sensibility.** Æsthesiometer registered 1.25.
- General Motility.** (1) Gait, hesitating, lacks confidence.
(2) Speech, clear with good enunciation. Coherent.
(3) Writing, legible; characters large with childish roundness.
- Muscular System.** Undeveloped. Dynamometer registered 37 for right and 34 for left hand.
- Circulatory System.** (1) Heart. Diminished apex impulsion with weakened first and second sounds.
- Respiratory System.** Normal.
- Menstrual Function.** During attack is subject to metrorrhagia, but it has no apparent influence on her mental condition.
- Blood Examination.** Hæmoglobin, 75 per cent.
Red corpuscles, 5,180,000.
Leucocytes, 15,000.
Rieder's H. & E. stain shows red cells in normal condition; no eosinophiles; few large monocular and many polynuclear neutrophils.
- Urinary Examination.** Negative.

SUMMARY.

In conclusion a brief summary of the principal features of the case may be correlated with profit.

Defective family history. Degenerate, eccentric, and irritable from infancy. Acute febrile disorder, i. e., scarlet fever in infancy. Shock from operation and sunstroke precipitating first attack. Frequent manifestations of treacherous and destructive tendencies. Disorder primarily emotional, secondarily volitional and intellectual. Quasi-maniacal outbreaks with turbulent remissions. Homicidal and suicidal impulsions. Kleptomaniacal and pyromaniacal tendencies. Claustrophobia. Expression of regret if act is detected, or denial if only suspected. Powers of self-control weak during remission and entirely lost during attack. Progressive decrease of intervals during which self-control can be exercised, with corresponding increase of periods with complete loss of self-control. Multiple evidence of psychological and physical stigmata and degeneracy. Improbable relation of attacks to menstrual functions. Failure of treatment other than custodial.

THE CARE OF THE DEMENT'S MOUTH.

By LOUIS W. DODSON, M. D.,
Assistant Physician, Binghamton State Hospital.

During the past year my service on the male side has consisted largely of those who are untidy and uncleanly, who require to be washed, dressed and put to bed like children, and who pay little attention to anything other than their physical wants. Some are reduced to such depths that even hunger, thirst, and cold, cause no reaction, and would succumb to inanition and exposure were they not fed and tended. Others pick ravellings from their clothing and chew them; a few, despite all vigilance, sometimes drink from the cuspidors, and will even eat their own excrement. In the belief that all this must lead to a foul condition of the mouth, an examination was made which showed that in many cases the teeth were covered with tar, the gums spongy and bleeding readily, the tongue coated, the breath fetid. Stomatitis with all its Protean manifestations frequently appeared and in the cachectic and aged sometimes indirectly contributed to a broncho-pneumonia, which invariably terminated in death. To make such patients care for their mouths with tooth-brushes was an impossibility, so on the worst cases a twenty per cent solution of the proprietary Listerine was exhibited as a mouth wash with marked improvement. This, however, was too costly for universal use (sixty-seven cents per bottle, wholesale) and our druggist, Mr. Burt E. Nelson, made up the following mixture whose formula is absolutely identical with the proprietary preparation:

R	Acidi benzoici.....	10
	Acidi borici.....	20
	Sodii boras.....	10
	Thymol.....	3
	Eucalyptol.....	.6
	Olei gaultheriæ.....	6
	Olei menthæ piperitæ.....	.5
	Olei thymi.....	.1
	Glycerin.....	50
	Alcohol.....	200
	Aquæ q. s. ad.....	1,000

Dissolve the three oils, the eucalyptol, the thymol and the benzoic acids in the alcohol and then add the glycerin. Mix the above solution with the water in which the borax and boric acid have been first dissolved, and to the resulting milky mixture add twenty-five grams of precipitated phosphate of calcium as a clearing agent. Agitate frequently during twenty-four hours or over, then filter, and a perfectly clear preparation will result.

The cost of this is about twenty cents per litre, or in larger quantities seventy-five cents per gallon, and one gallon will make five gallons of a twenty per cent solution.

Three months ago the attendants were instructed to wind a small bit of absorbent cotton around the index finger, then dip it in the twenty per cent solution, which is amply strong, and each morning carefully cleanse the teeth and gums, going in behind the wisdom teeth and, if the patient permitted it, under the tongue, inside the teeth, and over the roof of the mouth. In exceptionally dirty cases this was likewise done at night. At first a few resisted, but as soon as they became assured that neither pain nor discomfort attended the procedure, they readily assented. If there be danger of being bitten, a sponge holder is used instead of the finger, but at best it is a poor substitute.

The advantage of this method is that everyone has a separate piece of entirely new cotton, and the danger of contamination from one to the other is practically *nil*. The cheapness should also be considered. One-half yard (one and one-half ounces) of absorbent cotton costs three and a half cents, and one-half litre (about one pint) of the twenty per cent solution as prepared here, two cents, a total of five and a half cents. With these an entire ward of fifty patients can be thoroughly swabbed once.

Surely a measure so efficacious, so simple and so economical deserves trial. Toothbrushes are available on the convalescent wards for the better classes, but much care is entailed in their separation and proper distribution, and what could be more repulsive to a sensitive patient than to discover that he had used another's brush? They also wear out rapidly and if allowed to remain damp and uncleaned

become bad-smelling. After using the Listerine all the wads of cotton can be collected and burned, nothing remains which can become mildewed and mouldy. Again, how many of our patients, the majority of them farmers, artisans and mechanics, have ever used a brush or can be persuaded to do so?

During the past few years spray baths, tiled lavatories, toilet paper, well-arranged rooms for the segregation of linen, in fact, everything that can conduce to the comfort and cleanliness of the unfortunate insane have been given to the large hospitals, but if, despite all this, he awake each morning with a mawkish taste in the mouth, if food be allowed to remain adherent to the teeth, to there undergo fermentative and later putrefactive changes, showing what a favorable nidus it is for the growth of a multiplicity of bacteria* of which the mouth always contains more than its share; truly we cannot be surprised to sometimes see a gradual failure in flesh, a lack of appetite, an insidious dyscrasia for which the physician can find no corresponding lesion. It is then that the teeth, gums and tongue should be inspected. How often does the ward physician, when the breath is slightly fetid, order a cathartic, believing that the stomach and intestines are at fault. Foul mouths undoubtedly predispose to such disorders, but of what use is it to treat them and leave the primary cause untouched? But better still is prophylaxis. In every branch of medicine "prevention" is now the treatment *par excellence*, and its applicability here requires no demonstration. Furthermore in *status epilepticus*, the bugbear of the asylum physician, where broncho-pneumonia is so frequently the harbinger of death, hourly oral cleansing should be rigidly enforced, and in general paresis, par-

* "In the material taken from the teeth of an old man who never cleaned his teeth, Leeuwenhoek found an inconceivable number of living animalculæ, which darted about more quickly than any he had ever seen before; 'the largest were present in very great numbers, and waved about by the locomotion of their bodies. Besides these, other animalculæ were present in such large numbers that the whole water seemed to be alive.'" Sims Woodhead, *Bacteria and Their Products*, page 51, also page 337 *et seq.*, Contemporary Science Series. These were among the very earliest of bacteriological investigations and were described by Leeuwenhoek in 1683.

ticularly in those cases which are bedridden and filthy, I invariably insist on the swab being used after food, be it solid or fluid. Too much stress cannot be laid on these simple measures nor a plea for their adoption made too emphatic. If my confrères in other hospitals will put them to the test, if their results be as gratifying as mine, and sordid gums and coated tongue become sweet and clean, I feel that they will admit that there is "*multum in parvo*."

URINALYSIS OF INSANE PERSONS.

BY HAROLD JAMES MORGAN, M. D.,
Medical Interne, St. Lawrence State Hospital.

The following tables are self-explanatory. A careful examination will show the conclusions reached. The tables are modeled after those used by Babcock* although modified in many particulars. An attempt was made to put the results obtained in the form of a chart, but this was found impracticable.

As to the methods of examination, the writer realizes the fact that the urine examined was not in all cases the whole quantity passed in 24 hours, and this may detract somewhat from the value of this presentation, but in many cases this was impossible although attempted.

The urine of some patients was examined many times, and an average computed. The microscopical examinations were almost invariably made after the urine had stood for 24 hours. No record was kept of urea tests, therefore it is omitted from the table.

Standard tests were used in all cases and more than are generally resorted to for each constituent. Reference to urine of insane in literature are scarce, but one or two articles being available to the writer.

Upon examination of the first table we find that albumen is more frequently found in organic dementia (66.6% of cases examined), but, owing to the small number of cases available,

* Report of Maryland Insane Hospital for 1893.

it may be that this is an exaggerated ratio. The same may be true of the results of paranoia (40% of cases examined). In senile dementia, with a fairly large number of cases, albumen is present in 20.7% of the cases.

These results differ from those of Babcock (*vide* reference) in respect to his finding the highest percentage of albumen cases in epileptic insanity (one out of 5 cases), my results in this particular form of insanity being 2 out of 17 or 11.7%.

That albumen is very often found in the urine of insane persons is well known, and there can be no doubt that it is found much oftener than in the urine of sane persons. The following table gives a percentage of 12.3 of all cases or 37 out of 300 as containing albumen. This is much larger than I have seen stated in the bibliography at my command. There does not appear any unusual condition in the results, as they stand.

Glucose comes next in the table and here we find only 3 cases out of 300 containing this abnormality. Two of these were in acute melancholia, out of the 60 cases examined or 3.3%, while the other case was found in recurrent mania, out of 7 cases examined or 14.2%. It is evident we can draw no conclusions from these findings.

Phosphates in excess were found in 5% of all cases examined, the largest percentage being found in recurrent mania. Whether or not this excessive proportion is due to exhaustive conditions as a result of mental and physical activity, which is the prominent physical feature of this form of insanity, it is difficult to determine.

We might expect to find phosphates in excess, oftener in acute melancholia, on account of the physical depression in the greatest degree, but the table shows but 5%. Phosphates are noticeably absent in paranoia, general paresis and organic dementia.

Urates in excess were found in 33.3% of cases of organic dementia (2 out of 6). In acute mania the urates were in excess in 21.5% (14 out of 65). Their presence in 13.3% of all cases examined gives a large average.

Uric Acid in excess is more frequently found in acute mania (35.3 of the 65 cases examined). Chronic melancholia

is next on the list with 31.2%, and the lowest percentage was found in senile dementia (12.1%). Of all cases examined 22.3% contained uric acid in excess.

There does not seem to be anything particularly remarkable in these results, Tissue metabolism may be increased in one form of insanity and diminished again before any results can be obtained and of course the rise and fall of percentages of uric acid vary with this tissue change. The order given in the table is the commonly accepted one, but it seems inadequate to express any definite results or to permit any valuable conclusions.

Calcium Oxalate.—This constituent seems to be pretty well distributed throughout the various forms of insanity. Leaving out those forms in which the number examined was too small to accurately determine results, it appears that in acute and chronic melancholia the percentage is large, 11.6% and 12.5% respectively. This conforms with one of the conclusions reached by Beneke, quoted by Purdy*. Oxalic acid has its chief source in the azotized constituents of the blood and food, hence everything which retards the metamorphosis of these constituents gives rise to oxaluria. Such retardation may be determined by * * * * * conditions of the nervous system entailing depression, whether arising primarily from mental derangement or from pathological states of the blood.

The specific gravity seems worthy of consideration. It was as a rule high, 184 out of 300 cases being above normal (1020); the average for the males being 1023.5 in 182 cases, and for the females 1023.5 in 118 cases. Babcock, in the report of 110 cases mentioned, gives an average of 1023.5 for females and for males 1025.5.

My results are practically the same, the actual difference in the figures resulting from the difference in the number of cases examined. The highest specific gravity was 1038, which was found in a case of acute mania, (no albumen or sugar, but uric acid in excess). The lowest was found in a case of subacute melancholia, 1005, (triple phosphates).

Our conclusions then are as follows: 1. The urine of insane persons has an average specific gravity higher than

* Practical Urinalysis and Urinary Diagnosis.

normal, i.e., the amount of solids is increased. 2. Albumen is more often found in senile dementia. It is a fairly common abnormality in the urine of the insane. 3. Phosphates, urates, uric acid and calcium oxalate are increased in insanity. Phosphates in excess are more often found in recurrent mania, urates and uric acid are more common in acute mania, and calcium oxalate is generally found in those forms of insanity characterized by a depressed mental condition. 4. The percentage of cases examined containing abnormalities is large, 212 out of 300, or 70.6%.

	Acute Mania.		Chronic Mania.		Acute Melancholia.		Chronic Melancholia.		Recurrent Mania.		General Paresis.		Paranoia.		Epileptic Insanity.		Terminal Dementia.		Senile Dementia.		Organic Dementia.		Total No. Ab-normals.		Per cent of total number containing abnormalities.		Gradients.
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	%	%	
Albumen,	9	0.2	2	6.0	4	6.6	2	12.5	1	14.2	2	11.7	2	4.0	2	11.7	3	7.3	0	27.2	4	66.6	37	12.3	37	12.3	
Glucose,	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Phosphates in excess,	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Urates in excess,	44	6.1	2	6.0	3	3.3	...	...	1	14.2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Uric Acid in excess,	23	35.3	5	15.1	10	16.6	3	18.7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Calcium Oxalate,	6	9.2	1	3.0	7	11.6	2	12.5	1	14.2	2	11.7	2	4.0	2	11.7	3	7.3	0	27.2	4	66.6	37	12.3	37	12.3	
Mucus in excess,	5	7.6	3	9.0	2	3.3	2	12.5	1	14.2	1	5.8	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Total No. each disease	89.2	118	54.5	40	66.6	14	87.5	6	85.7	9	52.0	5	100	8	47	26	53.4	22	66.6	6	100	212	70.6	212	70.6		
Total No. examined.	65	...	13	...	109	...	16	...	7	...	17	...	5	...	17	...	41	...	33	...	6	...	300	...	...	...
* % of cases examined.																											
	Acute Mania.		Chronic Mania.		Acute Melancholia.		Chronic Melancholia.		Recurrent Mania.		General Paresis.		Paranoia.		Epilepsy.		Terminal Dementia.		Senile Dementia.		Organic Dementia.		Total.				
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.			
Normal (100)	5	4	...	3	1	1	...	...	2	3	...	3	...	2	...	...	5	...	4	3	6	1	...	46			
Above Normal	29	17	12	7	24	17	6	3	...	12	...	2	...	7	...	3	...	10	6	3	1	...	184				
Below Normal	6	4	9	2	10	7	...	4	...	1	...	...	...	4	...	1	...	6	...	8	...	...	70				
Total.	40	25	21	12	35	25	6	10	2	5	17	...	5	...	13	...	16	...	20	...	5	...	300				

Average—Male, 102.5; female, 102.5.

Average—Male, 1003.5; female, 1001.5.

MENSTRUATION IN ITS RELATION TO INSANITY.

BY E. H. HOWARD, M. D.,
Superintendent, Rochester State Hospital.

The menstrual record at a State hospital, being based upon correct data and personal observation, presents exceptional opportunity for reliable deductions.

The following observations, made by Dr. Evaline Ballantine during the past four years, cover in each case not less than twelve months' record of two hundred insane patients, who had not reached the menopause. Of these two hundred patients, eighty-five were regular, eighty-seven irregular and twenty-eight did not menstruate. This shows that only a small proportion (about forty-two per cent of insane women) maintain the menstrual function regularly.

Of the eighty-seven who menstruated irregularly, twenty-three are over forty-five years of age and thirty-nine are suffering from disease involving the pelvic organs. From one of these patients both ovaries and tubes have been removed, the sections of the tubes having been made close to the uterine body. Fourteen are afflicted with a debilitating constitutional disease, which could account for the irregularity. This leaves eleven whose irregularity might be accounted for by their mental disease. Of the twenty-three patients menstruating irregularly, who are over forty-five years of age, it is noted that eighteen are suffering from physical disease involving the pelvic organs.

Of the twenty-eight patients who did not menstruate, only four present a history which fails to give a possible reason for the amenorrhœa, without taking their mental condition into consideration.

Of the two hundred, twenty suffered from severe dysmenorrhœa, of whom eleven have disease of the pelvic organs; seventeen are afflicted with metrorrhagia, all of whom have disease of the pelvic organs; fifteen suffer from menorrhagia, of whom eleven have pelvic disease; four are much more disturbed during menstruation, while one hundred and forty-seven have apparently no discomfort.

A careful tabulation and study of the forms of insanity from which the total number of patients have suffered, fails to elicit any facts which seem to ascribe any particular form of mental disease with a causative relation to abnormalities of the menstrual function. In a general way, it is proper to state that during the acute stage of all forms of insanity the regularity of the menstrual functions is impaired and in many cases of acute mania cessation is concomitant with the mental disease. In this paper it is not intended to consider those cases in which insanity is caused by cessation of the menses, as this record could not contain facts bearing upon that subject.

When the irregularities of menstruation occur in the course of the mental disease, in a similar manner to which they may occur in many other diseases, regularity often returns without being accompanied by the restoration of mental health.

BONE-MARROW IN ANÆMIA.

The Editorial Committee has requested the several hospitals to undertake a series of experiments, in the use of bone-marrow in insanity complicated with anæmia. The time has been too short to obtain an extended report, but two valuable preliminary reports are herewith appended, that may prove of use in suggesting forms and points for observation. In the next BULLETIN a comprehensive report upon this subject will be presented.

P. M. W.

ST. LAWRENCE STATE HOSPITAL.

REPORTED BY CAROLINE S. PEASE, M. D.,
Woman Assistant Physician.

The subjoined report of seven cases of simple anæmia treated by bone-marrow, embody the observations made in this hospital on its use.

In no instance was any other drug or treatment administered while the patient was being given bone-marrow.

I offer this report with some hesitancy, since it has not been possible in this series of cases to give sufficient time to

this work to do more than make the necessary weekly examinations as to hæmoglobin, red discs, leucocytes and weight of patients, with daily observation as to their physical and mental condition. No examination of stained specimens could be carried out; nor have examinations of the urine been made. For a later report, twelve other cases are now under observation.

The preparation of bone-marrow used was manufactured by us from week to week as needed, by macerating for four days the finely broken cancellated bone of sheep's ribs containing the red marrow, in pure glycerine at 70° F. and straining the resultant fluid through flannel, when it was ready for use.

In the selection of cases for observation, the blood of a dozen of the most anæmic looking patients on two wards of chronic insane was examined, and of these, the seven having the lowest average were placed under treatment. It will be observed that in two of these cases the red discs were respectively 5,030,000, and 6,000,000, per cubic millimetre, but the number of leucocytes was large, and the percentage of hæmoglobin low. Both patients presented a markedly anæmic appearance.

On November 16th, the first preparation of marrow being ready for use, the patients were weighed, and three hours after breakfast specimens of blood were taken from the finger for examination. The instruments used were the Gowers' hæmoglobinometer and hæmocytometer. I believe an opinion is current among observers that these instruments have too high a standard, especially so the hæmoglobinometer.

Stockton of Edinburgh states that "the normal percentage of hæmoglobin in women is only from 82 to 88 on Gowers' hæmoglobinometer," and Henry and Stengel* state that it is very unusual to reach 95 and 100 per cent with Gowers' instrument. In noting the blood changes during treatment of my cases, it will be interesting to bear these statements in mind.

The intended dose of the marrow preparation was a

* "The Annual of the Universal Medical Sciences."

dessertspoonful t.i.d., but by a misunderstanding, double this amount was given during the first five days. My attention was called to the fact that "diarrhœa" was manifesting itself in several of the cases, and inquiry developed the fact that they were getting a tablespoonful t.i.d., which accounted for the supposed diarrhœa. The dose was reduced to a dessertspoonful t.i.d., but as even this quantity of glycerine proved laxative in some of the cases, at the end of the eighth day the dose was further reduced to a teaspoonful t.i.d., which amount was well borne by all.

During the first week of treatment, the hæmoglobin in six cases increased from 5 to 20 per cent. In one only, it remained stationary, but this patient was menstruating when the examinations were made at the end of the week.

At the end of the first week, in six cases a marked increase in the number of red discs had occurred; while in one case, in which the number was 6,000,000 previous to treatment, there was a fall to 4,800,000.

At the end of the first week (while taking the large doses,) the leucocytes were very greatly increased in number—in two cases being more than doubled. From the time the dose was reduced to a dram t.i.d., the general trend of the number of leucocytes was downward, though in individual cases fluctuating more or less.

During the five weeks under observation, the per cent of hæmoglobin was increased from an average of .47+, to an average of .81+; the number of red discs was increased from an average of 4,084,000 to an average of 4,731,000; and the number of leucocytes was decreased from an average of 15,000 to an average of 6,000.

The changes in weight during treatment were practically none, there having been a gain of only 1½ lbs. in the aggregate weight of the seven patients.

The appetite seemed to be unaffected by treatment. Sleep, so far as it could be observed, seemed also to be unaffected.

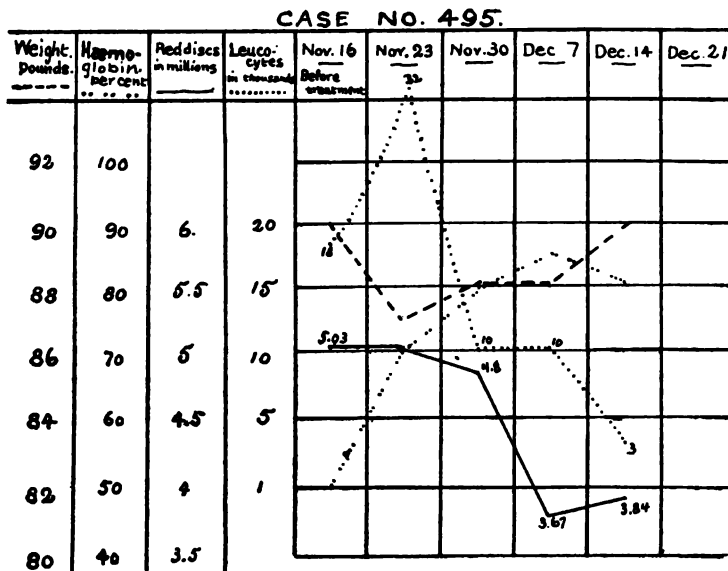
In three cases it was thought the mental condition was somewhat less dull.

In case No. 1062, a woman at the menopause, subject

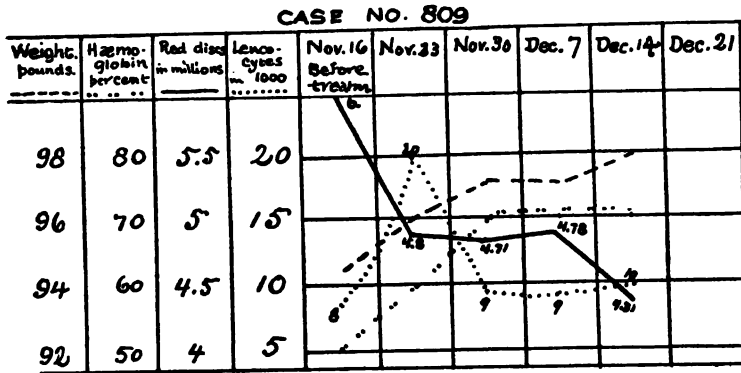
monthly to profuse and exhausting metrorrhagia, the examinations of Nov. 16th and Dec. 14th were made while she was in bed after a severe hæmorrhage. On these dates the percentage of hæmoglobin and number of red discs were lower than at any other times. With the exception of this case, there was a steady, regular rise from week to week in the percentage of hæmoglobin, reaching in two cases 80, in two cases 85, in one 90, and in one 100, at the end of five weeks. The increase in number of red discs was neither so marked nor so regular as that in hæmoglobin, though the average tendency was to a slight increase. In every case there was a marked diminution of the number of leucocytes after the reduction in dose was made.

I append charts of the cases, showing weight in lbs., percent of hæmoglobin, and number of red discs and of leucocytes per cubic millimetre.

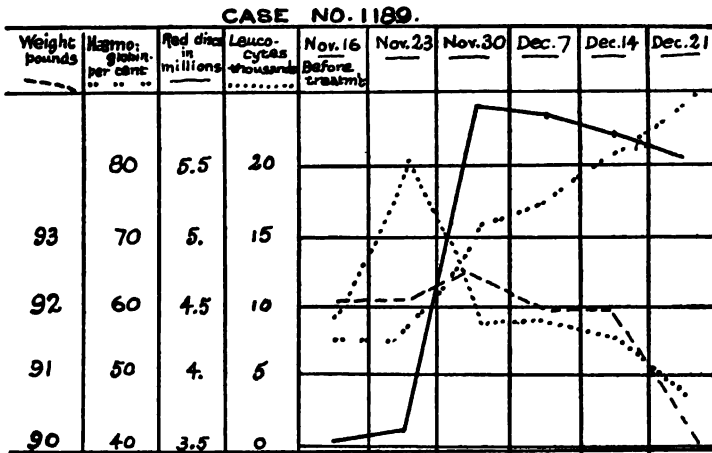
CASE No. 495.—Female. Age 30. Chronic Melancholia.



CASE No. 809.—Female. Age 65. Dementia

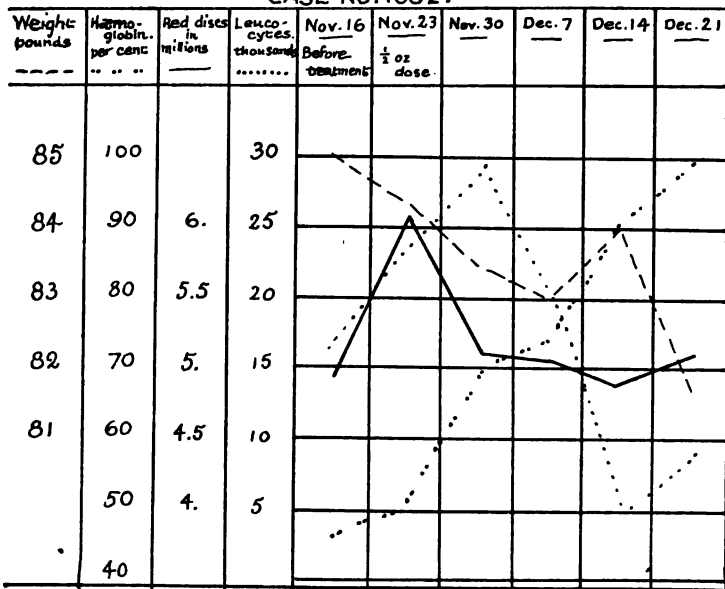


CASE No. 1189.—Female. Age 20. Chronic Melancholia.



CASE NO. 1062.—Female. Age 45, Dementia.

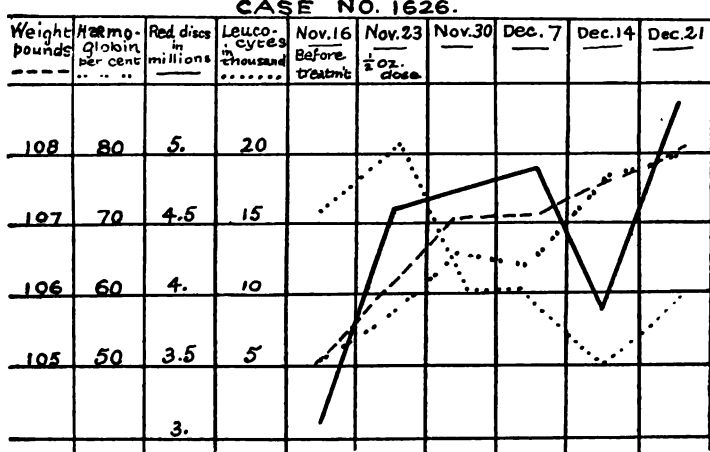
CASE NO. 1062.



Patient is anæmic from loss of blood at each menstrual period. Per cent of hæmoglobin and number of red discs less during menstruation than at other times. Whole gain in this case at end of five weeks was ten per cent in hæmoglobin and 760,000 red discs per cu. millimetre.

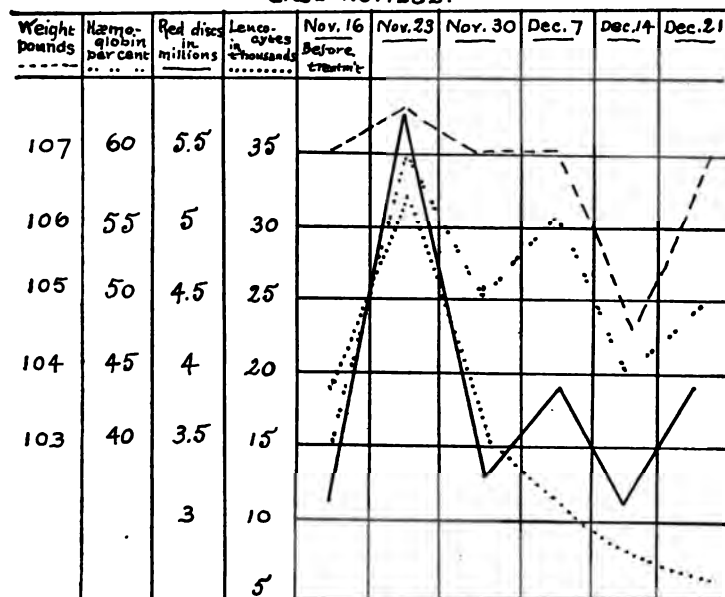
CASE NO. 1626.—Female. Age 50. Chronic Melancholia.

CASE NO. 1626.



CASE No. 1282.—Female. Age 57. Chronic Mania.

CASE NO. 1282.



A summary of these observations may be made as follows:

The administration of the red bone-marrow in these cases has thus far served to somewhat increase the number of red discs, to rapidly and greatly increase the percentage of hæmoglobin, and to greatly decrease the number of leucocytes in the blood.

ROCHESTER STATE HOSPITAL.

REPORTED BY E. H. HOWARD, M. D.,
Superintendent.

L. C., female, age 31, weight 96 lbs.

Dementia—terminal

Appetite good—industrious—helps in infirmary ward—makes beds—scrubs.

Examination:

Dec. 4—No. of red blood cells—2,525,000—hæmoglobin 25 per cent.

" 12 " " " 3,095,000 " 20 "

" 21 " " " 4,275,555 " 30 "

" white " 1,171

J. T., female, age 35, weight 105 lbs.

Chronic melancholia.

Has eaten only bread and milk, cereals, fruit, pie and cake. Refuses meat and vegetables.

About a year ago had slight uterine hæmorrhage for six weeks. Has uterine myoma. No hæmorrhage for last nine months.

Examination:

Dec	4—red corpuscles—	1,612,500—hæmoglobin	25 per cent
"	12 "	2,820,000	" 25 "
"	21 "	2,452,222	" 30 "
	white	1,172	

The above patients are taking $\frac{1}{2}$ oz. of glycerite of bone-marrow t.i.d.

REPORT OF A CASE OF DIAPHRAGMATIC HERNIA.

By CHARLES F. LA MOURE, M. D.,
Medical Interne, Rochester State Hospital.

D. F., male, aged 61. A subject of chronic mania for 24 years. September 1st, 1894, he complained of headache and pain in abdomen, became slightly cyanotic, temperature went up to $104\frac{2}{3}$, pulse 104 and respirations 37. Dullness over left chest, and bronchial breathing present.

September 2d. Dullness still present, temperature $98\frac{1}{2}$ in morning, $99\frac{1}{2}$ in afternoon, pulse 86, respirations 24.

September 3d. Temperature in morning $99\frac{1}{4}$, afternoon $100\frac{1}{2}$, pulse 120.

September 4th, the patient was able to get up and assist about the ward as usual, and remained in fairly good health except for an occasional attack of dyspnoea until May 27th, 1895, when after a hearty dinner he complained of being sick. Was put to bed and died in a few hours.

At the autopsy, upon opening the thoracic and abdominal cavities, the stomach was found to be partly contained in each cavity, having perforated the diaphragm. The diaphragm contracted the stomach and was adherent at constriction which was about in the centre. The heart was displaced and forced upward and outward, the wall of the right ventricle being thin, pale and atrophied from constant pressure against the ribs. The hernia probably occurred at the time of his illness in September, 1894, and his death was caused by the distended stomach pressing on his weak, flabby heart.

THYROID FEEDING IN THE INSANE.

(The editorial committee has requested the several hospitals to institute careful experiments with thyroid feeding for report in the Bulletin. The time has not been sufficient for comprehensive reports, but several preliminary reports are of sufficient interest for publication at the present time, and follow herewith. This does not include Dr. Babcock's investigations, which were independent of, and antedated the request of the committee).

FROM WILLARD STATE HOSPITAL.

BY THE MEDICAL STAFF.

The subject of thyroid feeding in insanity has received such able treatment at the hands of Dr. Lewis C. Bruce* of the Royal Edinburgh Asylum and Dr. C. K. Clarke,† Superintendent of the Rockwood Hospital, Kingston, that little remains to be done in the direction of reporting the physiological effects of this method of treatment, however much our knowledge of its therapeutic value may require to be extended. The present report loses much in value from the fact that it is of necessity made before there has been an opportunity of observing to what extent, if at all, there has been induced a permanent improvement in the mental condition of the patients treated. It will, however, suffice to corroborate some of the views enunciated by earlier observers, and possibly in a future issue of the BULLETIN we may be able to record some tangible results.

The treatment herein referred to consisted in the administration, first, of thyreoidin (Parke, Davis & Co.) in tablet form, each tablet containing one-half grain of the product, which was represented to be equivalent to five grains of the gland; and, later, of desiccated thyroid, sold by the same firm. Of this ten grains is said to be the equivalent of a sheep's gland of ordinary size.

The cost of thyreoidin in tablets is considerably greater than that of the desiccated gland, and apparently it possesses no advantages over the latter. The patients, twelve men and ten women, were all cases which were not progressing toward recovery, but among them were a number who were considered not entirely hopeless, provided the

*Journal of Mental Science, January, 1895, and October, 1895.

†American Journal of Insanity, October, 1895.

proper impetus could be supplied to start them on the road to mental health—cases of commencing dementia following acute insanity—of hebetude and depression constituting chronic melancholia and of stupor with controlling delusions. Two of the men were suffering from general paresis having a syphilitic history; several of the women were old cases of puerperal insanity, which had not done well, while some of both sexes were confirmed demented, in whom, as in the cases of general paresis, no curative effect was anticipated. One, a terminal demented, was included in order that the effect of the treatment upon a chronic skin affection (psoriasis) might be observed.

All were given a thorough physical examination to begin with, including analysis of the urine, and none were passed for treatment who were found to be suffering from any serious organic disease.

They were weighed before being put to bed, and for several days before the administration of the remedy a record was made of the temperature, pulse, and respiration in each case.

Commencing with one tablet of thyreoidin thrice daily, the dose was rapidly increased to eight t.i.d., and this dosage maintained for from four to six days. Treatment was then discontinued for one week, owing to the supply of the drug being exhausted, after which they were given desiccated thyroid, at first eight grains t.i.d., increased after two days to twelve and then to sixteen grains after each meal.

Viewing the cases *en masse*, the following bodily symptoms were noted:

Pulse.—The pulse rate was accelerated in the majority of cases, though in only a small number did it exceed 100 and in but three reach 120. There was diminution of arterial tension as a very constant feature, while irregularity and intermittence were noted in several of the patients.

Respiration.—Slight increase in the respiratory rate was observed.

Temperature.—In only two cases did the temperature fail to rise above the normal point, but in none was there

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CASE.		Pulse. Beginning of Treatment.	Pulse. End of Treatment.	Average Pulse Rate.	Respirations. Beginning of Treatment.	Respirations. End of Treatment.	Average Respiratory Rate.
Masturbational Insanity,	MALES.	1	54	64	62	20	20 $\frac{3}{4}$
Stupor,		2	62	96	72	16	17
Acute Mania,		3	58	116	63 $\frac{1}{2}$	18	16 $\frac{2}{3}$
Terminal Dementia,		4	84	122	100	18	20
General Paresis,		5	72	88	72	14	18
Terminal Dementia,		6	76	104	92	20	20
Stupor,		7	70	72	77	20	18
Organic Dementia,		8	66	90	75 $\frac{1}{10}$	26	30
General Paresis,		9	81	96	92 $\frac{1}{2}$	20	30
Primary Delusional Insanity. { A young subject,		10	60	120	84	18	30
Adolescent Insanity—beginning Dementia,		11	80	120	85	22	24
Dementia following Mania,		12	64	112	81	17	24
Chronic Melancholia—Puerperal Insanity,	FEMALES.	13	72	82	....	18	16
Terminal Dementia,		14	72	72	....	16	18
Chronic Mania (mild),		15	85	85	....	18	18
Acute Melancholia—Puerperal Insanity,		16	73	98	....	18	20
Terminal Dementia,		17	78	88	....	17	22
Terminal Dementia,		18	90	101	....	16	20
Terminal Dementia,		19	86	85	....	23	21
Chronic Mania,		20	88	94	....	18	20
Chronic Mania,		21	84	86	....	16	20
Chronic Melancholia,		22	85	91	....	19	19

Temperature—Highest.	Temperature—Lowest.	Temperature. Average—Morning.	Temperature. Average—Evening.	Lost in Weight—Lbs.	Mental Condition During Treatment	REMARKS.
99	96.6	97.5	98	5	Brighter.	Heart weak and intermittent—treatment stopped.
99.2	96.2	98.3	98	....	Brighter.	Gained 2 lbs.
100.2	96.4	98	97.8	20	Unchanged.	Pulse weak, irregular and intermittent.
99.2	98.4	99	99	7	Unchanged.	Psoriasis more active—scaly.
98.8	97	98	98	9	Unchanged.	Convulsion (paretic) during treatment.
99.8	96	97.8	97.8	14	Unchanged.	Muscular twitching—was very nervous.
98.4	96.2	98	98	2	Unchanged.	
98.4	96.2	97.5	97.3	14	Unchanged.	
100	97	98.2	98.4	12	Unchanged.	
99.8	97	98	97.9	14	Improved.	Nervous and tremulous during treatment.
99	96.4	98	98.5	15	Unchanged.	Nervous and tremulous during treatment.
99.4	96.2	98	98.	4	Unchanged.	Nervous and tremulous during treatment.
99	97.4	....	....	7	Unchanged.	
99	98	....	....	5½	Unchanged.	
99.6	98	....	....	3	Brighter.	Patient menstruating.
100	98	....	....	1	Brighter.	
100.4	97	....	....	4	Unchanged.	Nauseated.
100.4	96.8	....	....	8	Brighter.	
100.4	98	....	....	....	Unchanged.	
99.6	98.4	....	....	11	Unchanged.	Greatly enfeebled by the treatment.
100.8	97	....	....	9	Unchanged.	Nauseated by the medicine.
99.6	96.8	....	....	4	Brighter.	

any marked elevation, while a number of the patients had subnormal temperature, even during the period when the physiological action of the medicine was most obvious; so that, on the whole, lowering of the temperature was noted as frequently and to as great a degree as elevation.

Skin.—Flushing of the skin, with more or less injection of conjunctiva, occurred in practically every case, and this condition was, as might be expected, coincident with softening of the pulse and increase in the amount of perspiration.

Alimentary Canal.—A fair appetite was preserved during the first week of treatment, after which there was a lessened desire for food, and in a few instances nausea and vomiting were induced.

The tongue was lightly, and in some cases, heavily coated, and most of the patients were constipated. In only one was diarrhoea noted during the treatment, and this was regarded as an accidental complication.

Headache.—Was frequently complained of concurrently with the flushing of the face and other signs of more active circulation.

Loss of Weight.—This was the most noticeable of the results obtained. In one case it amounted to twenty pounds, and in five others the decrease was from twelve to fifteen. Some, however, lost only a few pounds, while one patient actually gained two pounds, and another weighed exactly the same at the end of the treatment as when it was commenced.

Tremor and Muscular Twitching.—Were noted in five cases, occurring in the extremities as well as in the tongue and facial muscles, and some of the patients who had no actual twitching of the muscles were observed to be quick and jerky in their movements.

Urine.—Amorphous urates were present in the urine of a few patients who had exhibited marked febrile reaction, but further than this nothing noteworthy was elicited by the examination of this secretion.

Some of the patients were left in a markedly debilitated state by the treatment; several required stimulation with

wine or whiskey and heart tonics, and one exhibited such pronounced weakness of the heart's action that the medicine had to be discontinued after a trial of one week.

The accompanying table shows in concise form the principal points of interest in this series of cases, so far as can be reported at the present time, the ultimate effect of the treatment upon the mental condition being, as stated, still unsettled.

In at least one case, which was heretofore most discouraging, there seems to be a fair prospect of recovery, and others are improved, though their cases are not so definitely hopeful.

NEW YORK STATE PATHOLOGICAL INSTITUTE.

The Editorial Committee take pleasure in announcing the appointment of Dr. Ira Van Gieson of New York, to the position of Director of the Pathological Institute of the State Hospitals for the Insane. The Institute, as previously announced, is a permanent institution established recently under the direction of the State Commission in Lunacy, pursuant to Chapter 693, of the Laws of 1895. Dr. Van Gieson was selected after a special competitive civil service examination, which embraced a series of questions in general pathological anatomy, the architecture of the nervous system, minute anatomy of the nervous system, pathological anatomy, technique and methods of neural investigation and the lines of research to be applied to the study of the pathology of insanity. Dr. Van Gieson has been connected with the laboratory of the College of Physicians and Surgeons, New York City, for ten years as an instructor in normal histology and neurology. His training has been well adapted to fit him for the important position to which he has been appointed. Hereafter the BULLETIN will record the progress in this department of the State Hospital service, although the preliminary requirements in laboratory fitting, and in establishing systematic work in the several hospitals, may delay the first report beyond the next issue of the BULLETIN.

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SOME OBSERVATIONS ON THE USE OF BONE-MARROW IN ANÆMIA AND ITS EFFECTS ON THE MENTAL CONDITION OF THE INSANE.

BY CAROLINE S. PEASE, M. D.,
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While the efficacy of any alleged remedial agent is yet *sub judice*, each clinical straw in evidence which may help to weight the balance has something of value.

It is foreign to the purpose of this report to discuss theories as to the origin of the different blood elements, or as to what particular property in red bone-marrow goes to build up the wasted blood tissues, or where in the economy these changes are effected.

It is intended only to report the series of clinical observations on the use of bone-marrow, made in the wards of this hospital during a period of many weeks, with continued observations on the condition of the patients and the blood of each for months after discontinuing its use.

It is an accepted fact that the blood poverty in anæmia may consist essentially in a diminution in the total amount of blood while its respective elements retain their normal ratio, as after hemorrhages; in a diminution in the relative number of red corpuscles; in a great increase in leucocytes while the red corpuscles remain normal in number; or in a relative poverty of the red corpuscles in hæmoglobin, while the number remains practically normal, or even greater than normal.

While the conceded normal number of red corpuscles in woman is 4,500,000 per cubic millimetre, to find that those of a given patient number 6,000,000 per cubic millimetre, is not necessarily conclusive evidence that she is not anæmic.

The cases under observation at this hospital include examples of all the above mentioned conditions.

In a report by me in Vol. I, No. 1, of this journal, on the work done here, the methods followed were outlined.

That report covered a period of five weeks, and was limited to seven patients. Those seven are now further reported in Table III, and head the list of seventeen cases in Tables I and II.

Seventeen patients have now been under observation for six weeks while taking dram doses of glycerite of bone-marrow t.i.d., and in Tables I and II the conditions before, and at the expiration of, that period are tabulated, together with such mental changes as have come to a most unpromising set of patients, long the victims of chronic melancholia and dementia.

Five out of seventeen admittedly irrecoverable cases have shown decided improvement in mental condition coincidently with the improved physical tone.

The general condition of the patients while under treatment was almost uniformly better than previously: constipation, so generally prevalent with this class of cases, was greatly benefited; the appetite was good; sleep was almost without exception quiet and regular; the condition of the skin was better.

In one case, at least, "the unexpected happened." Osler* states that "in overworked persons of constipated habit and with sluggish livers there is a patchy staining about the face and forehead." This patient, Case No. 1324, had been of the laboring class, used no doubt to unsuitable food and bad hygienic conditions generally. She was notably constipated, and her face was pretty completely covered by brown patches, between which the very sallow skin showed in places. At the end of about a month of treatment, we saw with surprise that her skin was clearing up.

* Practice of Medicine, pp. 7-9.

The process was continuous, and now at the end of sixteen weeks, during ten of which no marrow has been given, there is but one pigment spot the size of a nickel left on her face, while the skin has assumed a healthy and noticeably fresh and rosy tint for a woman of her sixty-seven years. It is not claimed for this case that the marrow has shown a specific action on pigmentation areas, but simply that by the bowels becoming regular in action, and the blood condition improved, the skin has taken on a healthier action, as was observed in many of the cases.

In point of weight it was seen that during the six weeks' treatment the general tendency was to a slight loss, though a few gained somewhat. On the seventeen patients there was an aggregate loss of seventeen pounds, an average of one pound each. The loss in weight was present in too large a proportion of the cases to be explained except as a result of treatment. On discontinuing its use a prompt gain in weight was noticeable, which, in the majority of cases, has continued to date.

It being a question whether the blood conditions would not at once relapse into their former impoverished state on the withdrawal of the remedy, it was deemed advisable to discontinue its use at the end of six weeks, when improvement had progressed well on toward normal, and keep the patients under observation for a long enough period to demonstrate whether the gain was likely to be a permanent one.

The first seven cases, with this end in view, have now, since discontinuing its use, been under observation and the blood tested at regular intervals for a period of eight weeks.

So far from relapsing, a continuous steady improvement in the blood condition has taken place.

These cases, under observation earlier than the succeeding ten, and tabulated in Table III, showed at the end of eight weeks after discontinuance of treatment, not only that they had regained all they had lost during the preceding six weeks, but an additional aggregate gain of sixteen and three-fourths pounds, an average of two and a fourth pounds each over their weight at beginning; making

a total average gain of three and a fourth pounds in the eight weeks.

By referring to Table II which covers the period of six weeks' treatment, it will be seen that the hæmoglobin was markedly increased in every instance. In Case Nos. 1282 and 379, less improvement is noted than in any of the others, being but .25 in the first and .10 in the second.

It is but proper to state here that in the first case the anæmia was due to loss of blood at each menstrual epoch; that she invariably made a steady gain from week to week during the intermenstrual period, and retained each month a little more of the gain than she had done the preceding month. It is proper to state also of this case that for two years previously she had been under constant treatment with the different iron preparations, arsenic, and the bitter tonics, but with little noticeable benefit.

The writer has observed this patient for more than five years at the Hudson River State Hospital and in this, as one of the most inactive and hopeless of demented, apparently retaining little beyond "vegetative functions." She now sews regularly and skilfully for several hours daily on the ward, is tidy in personal appearance, and answers questions regarding her subjective symptoms with promptness and a fair degree of intelligence.

In Case No. 379 we know no reason why her gain has failed to keep pace with that in all other cases.

During the six weeks the hæmoglobin in the seventeen increased from 30 to 45 per cent in all but these two, showing an average approach (including these two,) of 32 per cent nearer the normal proportion.

Referring now to Table III which covers the whole period of fourteen weeks for the first seven cases, it will be seen that the average gain from start to finish was 47 per cent, as against 32 per cent during the first six weeks, showing a continued gain of 15 per cent after the bone-marrow was discontinued.

The number of red corpuscles fluctuated surprisingly throughout the entire period in individual cases, but at the end of six weeks was found to have made an average gain

of 165,000 per cubic millimetre. At the end of fourteen weeks it had made an average gain of 944,285 per cubic millimetre.

The number of leucocytes was found also to fluctuate, and with no more explainable cause than for the red corpuscles doing so. But the average tendency was to a marked reduction, decreasing from an average of 17,500 per cubic millimetre to 10,000 in six weeks, and to an average of 6,714 in those under observation for fourteen weeks.

In the beginning—Table No. II—several of the cases showed a higher count than normal of red corpuscles, while the percentage of hæmoglobin was disproportionately low, indicating an exceedingly low "corpuscular value."

It is conceded that the number of red discs may be very high, yet the average value of each in hæmoglobin very low; and an ingenious method of ascertaining the approximate richness or "value" of each is given us in using as the numerator of a complex fraction the percentage of hæmoglobin, and for the denominator a simple fraction having for its numerator the number of red corpuscles found, its denominator being the normal number. Thus: in a case showing 40 per cent hæmoglobin, with 3,500,000 red corpuscles, the normal number being 4,500,000, we find $\frac{40}{\frac{3500000}{4500000}} = \frac{40}{3.5} = 11.4$ which is the percentage of richness or "corpuscular value" of each red corpuscle.

It will be seen by referring to Table II, that this value averaged for the seventeen cases at the end of six weeks, 87 per cent as against 55 per cent at the beginning; and Table III shows that for the seven patients the average at the end of fourteen weeks was 86 per cent as against 56 per cent at the beginning; a gain of 32 per cent in the one case, and of 30 per cent in the other.

No attempt has been made at even an approximate estimate of the blood plates, but it was seen that while in the beginning nearly every specimen contained an abnormally large number, the number gradually diminished until it was not noticeably large.

The red corpuscles also in the beginning showed numerous abnormal types; poikilocytes, macrocytes and microcytes,

which gradually grew less until it was rather unusual to see anything but the normal bi-concave disc of correct size.

In summing up our results thus far and with the larger number of cases, I believe that to the conclusions with which I closed the previous report, viz., that "The administration of the red bone-marrow in these cases has thus far served to somewhat increase the number of red discs, to rapidly and greatly increase the percentage of hæmoglobin, and to greatly decrease the number of leucocytes in the blood," I may safely add that it has served to greatly increase the corpuscular value of the blood, it has improved noticeably the mental condition of nearly one-third of the cases, it has materially increased the average body weight, and that it has ministered to the æsthetic sense which I suppose may lie dormant even in a pretty hopeless terminal dement, as evidenced in the satisfaction one poor woman takes in her improved complexion.

TABLE No. I.

Seventeen cases—showing Case No., age, diagnosis, weight before and after treatment, and changes in mental condition after having taken bone-marrow six weeks.

	CASE. NO.	AGE.	DIAGNOSIS.	WEIGHT.		CHANGES IN MENTAL CONDITION.
				Before.	After.	
1	1324	67	Dementia.	90	90	Brighter and less confused.
2	309	33	Ch. Mel.	94½	98½	No noticeable change.
3	1189	22	" "	92	90½	" "
4	1062	28	" "	85	82½	Marked improvement.
5	1282	47	Dementia.	107	108	" "
6	1061	33	Ch. Mel.	97	99	No change.
7	1226	59	" "	105	110	" "
8	1504	40	Dementia.	101	100	" "
9	1639	80	" "	121	118½	" "
10	1335	43	Ch. Mel.	113½	115	" "
11	308	36	Dementia.	114½	114	" "
12	379	38	" "	126½	125	" "
13	300	45	Ch. Mel.	119	111½	Considerable improv'm't.
14	406	66	" "	122	120	No change.
15	1357	44	" "	108	101	Brighter and less confused.
16	1532	27	Dementia.	94	91	No change.
17	1424	60	Ch. Mel.	119½	118	" "
Av'ge				106½	105½	

TABLE No. II.

Seventeen cases—showing changes in condition of blood produced by administration of bone-marrow for six weeks.

	HÆMO- GLOBIN.		RED CORPUSCLES PER CU. MILLIMETRE.		LEUCOCYTES PER CU. MILLIMETRE.		CORPUSCULAR VALUE.	
	Before.	After.	Before.	After.	Before.	After.	Before.	After.
1	.50	.95	5,030,000	3,980,000	18,000	12,000	.45	.107
2	.50	.82	6,000,000	4,770,000	8,000	12,000	.37½	.79
3	.55	.90	3,510,000	5,680,000	8,000	18,000	.71	.78
4	.45	.90	4,830,000	5,060,000	17,000	13,000	.42	.81
5	.40	.65	3,100,000	4,290,000	18,000	9,000	.58	.70
6	.45	.80	3,000,000	4,520,000	19,000	19,000	.67	.91
7	.50	.88	3,120,000	4,470,000	17,000	9,000	.72	.90
8	.55	.80	3,060,000	4,250,000	20,000	7,000	.79	.85
9	.60	.90	3,090,000	3,290,000	8,000	4,000	.87	.122
10	.55	.92	3,510,000	3,750,000	25,000	6,000	.71	.109
11	.50	.92	4,620,000	4,010,000	18,000	6,000	.49	.103
12	.38	.48	4,670,000	4,380,000	45,000	15,000	.36	.48
13	.50	.85	4,430,000	4,790,000	17,000	8,000	.51	.80
14	.40	.75	4,910,000	3,920,000	24,000	9,000	.37	.87
15	.55	.90	5,200,000	4,920,000	23,000	8,000	.48	.82
16	.50	.90	5,250,000	4,640,000	14,000	7,000	.42	.86
17	.50	.90	5,880,000	4,920,000	6,000	6,000	.38	.83
Av'ge	.49	.81	4,340,000	4,505,000	17,500	10,000	.55	.87

TABLE No. III.

Seven cases—showing body weight of patients and blood conditions two months after treatment is discontinued, as compared with condition before treatment.

	WEIGHT.		HÆMO- GLOBIN.		RED CORPUSCLES.		LEUCO- CYTES.		CORPUSCU- LAR VALUE.	
	Before	After	Before	After	Before	After	Before	After	Before	After
1	90	94½	.50	.101	5,030,000	5,730,000	18,000	6,000	.45	.79
2	94½	99	.50	.100	6,000,000	5,220,000	8,000	7,000	.37½	.87
3	92	97½	.55	.100	3,570,000	6,160,000	8,000	8,000	.71	.73
4	85	83	.45	.95	4,830,000	4,250,000	17,000	7,000	.42	.101
5	107	102	.40	.80	3,100,000	3,920,000	18,000	7,000	.58	.90
6	97	96	.45	.95	3,000,000	4,720,000	19,000	4,000	.67	.91
7	105	112½	.50	.100	3,120,000	5,260,000	17,000	8,000	.72	.84
Av'ge	95½	97½	.47	.94	4,092,857	5,037,142	15,000	6,714	.56	.86

NOTES ON THE USE OF SULFONAL AS A SEDATIVE.

BY ARTHUR WILLIAM HURD, A. M., M. D.,
Medical Superintendent, Buffalo State Hospital.

The use of sulfonal has been quite widely discussed in the medical journals for the past four years, and its employment as a sedative as well as a hypnotic was suggested by the article of Dr. J. Carlyle Johnstone in the *Journal of Mental Science*, for January, 1892. He classified the results according to three methods, viz.: The effects produced by single doses or doses separated by long intervals; 2d, those produced by doses repeated at intervals of 48 hours, and 3d, those produced by doses at intervals of 24 hours or more frequently, given at night.

We changed somewhat the method of administration from this schedule, and with results which it seemed to me might prove of use and value to others who have the care of cases of long continued disturbance. A group of 12 cases was selected, all of whom were women who were showing and had exhibited for a considerable period marked mental and physical disturbance; those few in fact, who by their excitement, disturbance, and tendency to noisiness, in this as in every hospital, were sufficient to render the disturbed ward at times noisy and uncomfortable for others; they being cases which had largely resisted other means of control and had not responded, either in the matter of quietness or sleep, to the means ordinarily used. The method was simply the administration of a moderate dose of sulfonal each morning before breakfast. The dose used was from 20 to 30 grains; was given about 6.30 in the morning, always in a hot solution, and was followed by no other administration of this nature whatever till the following morning. The cases were of different varieties: some of chronic mania; others of acute mania of moderately recent origin in whom the excitement persisted; and one of recurrent mania. Before considering the special effect upon these

different forms of mental disturbance, it may be stated in general that the effect was a sedative one throughout the day, but not sleep; in addition, however, these patients as a rule slept well the following night without another administration of any drug. The slow action of sulfonal is well exemplified in this: that its hypnotic effect was not manifested till the evening of the day of administration, while the patients were rendered comfortable during the daylight hours. The effect in general was to check activity, excitement and physical waste, giving a much better chance for repair and nutrition. This was the obvious general effect upon the individuals and the result in the quiet conduct of the ward was soon noticeable. Six of them were cases of long continued chronic mania, in all of whom the insanity had existed for a long time before admission; the patients ranging in age from 35 to 60 years. In none of these six cases did recovery take place, but in each there was a marked amelioration of the symptoms. In each the effects were similar and noticeable so soon after the beginning of this line of treatment as to induce us to believe that their improved condition was due to the administration of sulfonal. Without exception they were quieter, less destructive during the day, more contented and slept at night, whereas before they had been wakeful, and without exception each showed an increase in weight. Digestion was not impaired nor was the urinary secretion disturbed. The greater quiet and sleep was soon reflected in increased appetite and weight and better color. No. 7 was a case of recurrent mania in whom the periods of disturbance had previously been of long duration. Coincident with the administration of sulfonal in this case there appeared less excitement, less destructiveness, less insomnia, and the period of excitement was shorter than had been the history heretofore. Cases 8, 9, 10, 11, and 12, were each instances of acute mania in young women. In each of them the disturbance had lasted for a comparatively long period without any marked change. In each of these cases improvement both mental and physical began so soon after the exhibition of the drug, that we could not but believe that the im-

provement was not merely an accident, but was in some manner more or less dependent upon it.

To summarize, the administration of sulfonal in the morning in every case proved advantageous. In the chronic cases it was followed by increased mental and physical comfort, with a better condition of nutrition. In the cases of acute mania, while improvement might possibly have occurred in these four cases at that time, independent of this administration, yet the improvement was so soon manifested as to lead us to believe that it was an active agent for mental and physical restitution. The administration in none of the cases extended over a month continuously and in the cases of acute mania the necessity for it was past before the expiration of that length of time. No untoward effects whatever were observed, the condition of the patient being under careful observation continually. Aside from the individual benefits derived by the patients themselves it may be mentioned as a subordinate consideration that the condition of that ward was markedly and noticeably improved, and the comfort and the well-being of the other patients enhanced.

The drug was given in a hot solution, such as water or tea, or in water to which a little stimulant had been added, and sufficiently diluted to obviate the gastric and duodenal irritation which in some instances appears to have resulted from the exhibition of the drug in powder.

PARANOIA WITH AN UNUSUAL TERMINATION.

By DR. R. M. ELLIOTT,

Medical Superintendent Long Island State Hospital, Brooklyn Department.

This case is reported as being one of more than ordinary interest from its remarkable history, unusual termination, and singular method of suicide. William D—, aged 58, married, bookbinder by trade, was admitted to the Brooklyn department of the Long Island State Hospital on Dec. 2d, 1895, suffering from paranoia of a duration of over

fifteen years. It was his third admission here. He was first committed in July, 1885, after voluntarily consulting a physician in order that he might be adjudged insane, on the ground, as he stated, that he was afraid he would do serious injury to his father, with whom he had a joint interest in a bookbinding establishment. He had developed a delusion that his father had defrauded him to the extent of \$40,000, a matter which, he said, he wanted submitted to "arbitration," but his father refused. In consequence of this he had an irresistible desire to kill him, and this prompted him to seek admittance to an asylum, that he might be prevented from carrying out his insane desire. Six months later he was discharged unimproved as the result of habeas corpus proceedings. When in court he made the following statement to the judge: "I do not anticipate any trouble. I still feel that I have been wronged, but if I cannot restrain those hostile feelings in the future, I pledge myself to keep entirely away from him. If they come over me again I will give myself up to the criminal authorities. I lost \$40,000 by the wrongdoing of my father, but he has pledged himself to submit the trouble to arbitration." The judge's reply was: "You appear to be an intelligent man, and ought to know that if you have been wronged, the courts are open to you. I will order your discharge and place you in the custody of your wife and friends. Remember, however, that if you make any more threats or indulge in any acts of violence you will surely be arrested and punished the same as any other criminal." Again in 1888 he caused himself to be recommitted, by going to the court and asking to be sent to prison. He stated on this occasion that he had an "impulse" to shoot a cousin, who, as he believed, had wronged him and was conspiring to do him further harm. After being under treatment two months, he was liberated as before, on a writ of habeas corpus. He became estranged from his family and a year or two after attempted to kill his sister by shooting at her. For this he was indicted and served a term of five years imprisonment in the Kings County Penitentiary, being

liberated from there only a few months ago. It seems that in November he was present at the "Hannigan" trial in New York, and made some disturbance in court, shouting that he was an "expert on insanity," and that "Hannigan was insane." This caused his arrest and committal to Ward's Island Asylum, whence he was transferred here on the date mentioned. After admission he was quiet and orderly, but reiterated the belief that he was "an expert on insanity." When questioned relative to his family affairs, he declined to say anything unless in the presence of his legal adviser. He was rather restless, would not occupy himself at any kind of work, and preferred to be alone. He read the daily newspapers with apparent interest and conversed intelligently on current topics. At night he occupied a small dormitory with six other patients of the quiet, demented class. On Dec. 19th he retired to bed in the evening as usual. The night attendant reported that his last visit to the dormitory before going off duty the next morning was at a quarter to six and that he found this patient sitting up in bed apparently searching for something. He prevailed upon him to lie down until it was time to get up. At five minutes past six the day attendant entered and found him lying on the floor by the side of the bed, unconscious, and bleeding from the right eye, nose and mouth. A further examination by the medical officers revealed a piece of metal protruding out of the upper aspect of the right orbit to the extent of three-quarters of an inch. It was at once withdrawn and proved to be an old dinner fork which had penetrated the cranium to a depth of about six inches. The man died three hours later, and a necropsy made by the coroner showed that the fork had pierced the orbital plate at the optic foramen. Spiculæ of bone were driven back and lodged in the under surface of the anterior lobe, the tines passing over the greater wing of the sphenoid and backward into the cerebellum.

A verdict of suicide was the outcome of the inquest.

STATISTICAL METHODS; AND RECOVERIES IN
THE STATE HOSPITALS FOR THE YEAR
ENDING SEPTEMBER 30, 1895.

By P. M. WISE, M. D.,

Medical Superintendent, St. Lawrence State Hospital.

The value of statistics of the results obtained in hospitals for the insane, as ordinarily presented, have been recognized as doubtful, if not absolutely worthless, for many years; and yet, a mass of calculations attempting to show results are annually presented that do not show anything of value, for the reason that they lack the primary requisite of the possibility of analysis. The careful inquirer can receive no reliable information from the study of insane hospital statistics, as they are presented in gross, except the bare fact of the number of insane persons under care and treatment. There is no approximation to accuracy in the table of results, for the reason that it shows only the number who have left the institution in a condition which appears, in a certain number of cases, as a return to their normal mental condition, and in the remaining number, as a failure to reach it. Recoveries are reported before the element of strain has tested the recovery. The subjective conditions that exist in insanity are not capable of proper estimation to give value to statistics of recoveries, as the estimation depends too largely upon a personal observation and acumen, and a personal estimation, which is a changeable and uncertain element. Mortality statistics are exceptional, for death is ascertainable at once, beyond a doubt, but recovery is not.

There is, perhaps, no subject connected with alienism that has received the attention that has been given to the curability of insanity. It has a sociological interest beyond other statistical data. It is chiefly through this channel that serious criticisms have been launched at the modern hospital, for not presenting as large a percentage of recoveries as was published in the crude statistical tables of half

a century ago;* although it must be acknowledged that in our statistical methods we have made no great advance since that period.

In this State, as in nearly all others, the ratio of recoveries is based upon the daily average population. It matters not whether one institution may be chiefly custodial in character, and another with a rapidly changing population, they are judged from the same standard, particularly in the public estimation.

Psychiatrists have recognized the defects of the methods of presenting the data of hospitals, and to their credit it should be said that a constant effort is being made to improve them, unfortunately thus far without much success. At the present time a special committee of the American Medico-Psychological Association is engaged upon this subject, and in this State a committee of superintendents is laboring in the same sluggish stream.

I believe there can be no feasible scheme of intelligent presentation of insane hospital data, in a gross form; or, at least, statistics that will be sufficiently reliable and comprehensive for the student, without individualizing the data in the first place, and summarizing afterward, if summaries are requisite. To be more explicit, all cases designated in some manner that will permit of future reference however remote, must be reported individually with all the data usually required. In this way only can there be an intelligent rendering of results. A classification and summary can then be made susceptible of analysis, and subject to broad criticism, and statistics of insane hospitals will be relieved from dry rot. At first sight this proposition seems beyond practical reach from its magnitude, and it must be allowed that it will increase in a considerable degree, the present tabulated exhibit; but, upon reflection, not to an extent that would prohibit its adoption. The labor of compilation would not be increased beyond present requirements, for the individualized exhibit would be an epitome

*It was about fifty years ago that a certain institution in this country obtained notoriety by reporting 98 per cent of recoveries on discharges, but it was not made known that this result was founded on one year's experience in twenty-three cases only.

of the leading points of the case history. If it were merely necessary to show the time-honored facts of those admitted and discharged, such as, "assigned causes," "classification," "first and subsequent admissions," "hereditary tendency," "civil condition," "degree of education," "duration," "age," "occupation," and "nativity," the preparation of an individualized exhibit would be no more complicated than present requirements; and if summarized tables were added, additional space to the extent of the new tables would be the only demand. It has occurred to every statistical student, how lamentably our hospital tables fail to show the relation of things; as, for instance, a bald statement that in nine admissions during the past year the assigned cause of insanity was "cerebral disease," without giving other facts in relation therewith, cannot be used to any purpose whatsoever, and the fact would be as useful unstated. "General ill health" in 647 cases assigned as a cause of insanity without presenting other data is a waste of effort, time and material. If, in the former illustration, the relation of cerebral disease, its character and duration, the age, tendencies, nativity, occupation and other relative data to the insanity were shown, all susceptible of tabulation by the individualized method, statistics of assigned causes would assume a new importance.

The above suggestions may not be new. They may have been tried and found wanting, as the writer has not undertaken the bibliography of statistical methods. In the State of New York conditions exist most favorably to undertake the process herein suggested. The consecutive number of an admission, without any other designation, marks a case indubitably, and in the course of years it can be followed with accuracy, from admission to re-admission, or to its termination. Like scotography, it would transmit an intelligent conception through the present opaque exhibit.

The data of recoveries in our hospitals is of particular importance. Dr. Pliny Earle, in his reports of the Northampton Lunatic Hospital, has covered the fallacy of the ordinary statistical exhibit of recoveries so fully that its

treatment here would be superfluous*. He suggested an individual tracing of cases, in recoveries occurring more than once. If the suggestions herein made were carried into execution, a case could not be lost if its admission was confined to institutions where the system was in operation.

Table No. 1 is prepared to illustrate the individual method of presenting the data officially required in this State at the present time. The cases are taken consecutively from the case-books of the hospital from admissions for the past year. In reporting discharges individually, it might not be necessary to repeat all the data given in the report of admissions, as a reference to the latter would be a simple matter.

Table No. 2 is prepared, for the purpose of suggesting the possibilities of the individual method, and it can be made as comprehensive as desired; in fact, to an extent that would present in a line a fairly complete case history.

As a basis for computing results, the admissions to a hospital are, perhaps, as misleading as the average daily population. In some instances they are even more inadequate to give a truthful conception of results. In the case of this hospital, as accommodations have been provided from time to time, they have been occupied by the overflow from the other State hospitals; thus the mass of "admissions" as reported have been cases of long standing, perhaps passing through the same process of transfer many times previously, and reported as "admissions" in each instance. If in connection with the report of such an admission, these facts could be reported, it would give an adequate conception of the character of the case, and it could be appreciated at its true value. Certainly few, if any, recoveries can be expected from this class, and they should not be charged against the hospital in estimating results. This can only be done by the individualized method previously suggested.

In the annual reports of this hospital the writer has endeavored to correct this error, in some measure, by making an analysis of the character of cases admitted.

* "The Curability of Insanity," by Dr. Pliny Earle.

In the eighth annual report the following observations occur:

"In the present report of this hospital, there are 659 admissions reported. As a matter of fact the mass of these admissions were merely transfers of old cases from other hospitals. The sixty-nine reported recoveries figure insignificantly upon the basis of admissions as reported without this necessary explanation; whereas, computed upon the cases of generalized insanity of recent origin received from this hospital district, the showing is creditable. The propriety of an analysis of the admissions to this hospital for the past year, for the foregoing reasons, cannot be questionable.

"Of the 659 admissions, 409 were transfers from other hospitals and from county almshouses. Of cases received from the community under new commitments, 46 were of long standing in which chronicity had been established before they were placed under treatment. Of those suffering from constitutional degeneracies of all kinds—of evolution and involution—upon whom incurability is indelibly stamped at the outset of the alienation, there were 70. Of these 116 admissions it may be said, that recovery to a fairly permanent normal mental condition is an anomaly, and is not anticipated. They receive the fostering care of the State as its legal wards, for the purpose of care and custody, and, as far as possible, the amelioration of their distressing symptoms. The remaining 134 admissions were of symptomatic and systematized insanities, in which the duration of the disease had not been sufficient to establish a degeneracy, and where recovery is logically possible.

The recoveries resulting from these 134 hopeful cases before the close of the hospital cases, were 33. There were also 11 discharged before recovery was complete and which are reported as 'improved' or 'unimproved,' and 6 died, leaving under treatment at the close of the year 84, of which a favorable issue is anticipated in 49."

Any effort to create a barrier between hopeful cases of insanity and those that had passed the period of expectancy of curability, was disclaimed.

In order to get an average result of all the State hospitals upon some basis of analysis as herein described, for the last hospital year, an inquiry was sent to each of them containing the following questions, relative only to the admissions for that year:

(1) The number who were transferred from other hospitals and from county almshouses, for care—being chronic cases.

(2) The number received under new commitments from the community (homes), where the insanity was of long standing. In other words, cases that had become chronic before commitment.

(3) The number admitted suffering from degeneracies of all kinds—hereditary and acquired, of a constitutional nature, (of evolution and involution), "upon whom incurability is indelibly stamped at the outset of the alienation." There should be included under this head general paralysis, organic dementia, etc.; and all cases showing irreparable organic changes.

(4) The number suffering from generalized and sympathetic insanities, i.e., the acute forms in which the duration had not been sufficient to establish a degeneracy, and where recovery is logically possible.

(5) The recoveries resulting from class 4 within the year.

(6) The number of class 4 discharged "not recovered," but in which recovery might have been anticipated.

(7) The number of class 4 still remaining under treatment, in which recovery is anticipated.

(8) The number of class 4 who have died, and of such the number whose death was the result of the insanity, and the number of this class dying from other causes.

Replies were received from the Utica, Hudson River, Buffalo, Willard, Binghamton, Rochester, Matteawan and St. Lawrence State Hospitals. Although the inquiry was not interpreted alike, it was sufficiently correct to permit of a fairly uniform conclusion. The several reports are given verbatim, in order that any divergence may be noted.

Analysis of Admissions for the year ending Sept. 30, 1895.

UTICA STATE HOSPITAL.

Reported by Dr. W. C. GIBSON, Assistant Physician.

	Men.	Women.	Total.
Total admissions.....	260	134	394
1. Transfers—chronic cases	92	6	98
2. New commitments, (chronic).....	18	34	52
3. Degeneracies	41	33	74
4. Acute forms	99	61	160

	Men.	Women.	Total.
5 Recoveries from class 4, before close of year..	32	24	56
6. Discharged "not recovered" from class 4, (recovery reasonably expected).....	22	5	27
7. Remaining under treatment (recovery anticipated).....	40	30	70
8. Deaths from class 4			
(a) direct result of insanity.....	1	2	3
(b) from other causes.....	4		4
Not insane.....	5	1	6

HUDSON RIVER STATE HOSPITAL.

Reported by Drs. J. E. COURTNEY and T. E. BAMFORD, Assistant Physicians.

	Men.	Women.	Total.
1. Number transferred from other hospitals, and from county almshouses (chronic cases).....	51	65	116
Or 20.6 per cent on the total number of admissions.			
2. Number admitted under new commitments from homes (chronic before commitment)...	90	51	141
Or 25 per cent on the total number of admissions.			
3. Number admitted suffering from degeneracies in which there is no hope for recovery	141	116	257
Or 45.6 per cent on the total number of admissions.*			
4. Number admitted where a cure is logically possible	153	154	307
Or 54.4 per cent on the total number of admissions			
5. Recoveries resulting from class 4 before close of the year.....	33	30	63
Or 20.5 per cent of class 4.			
6. Number discharged "not recovered" from class 4, in which recovery is expected.....	21	18	39
Or 12.6 per cent of class 4.			
7. Number of class 4, remaining under treatment, in which recovery is anticipated.....	42	49	91
Or 29.6 per cent of class 4.			
8. Number of class 4 who died			
(a) as a result of insanity.....	8	11	19
(b) from other causes.....	4	6	10
Or (a) 6.5 per cent of class 4, and of (b) 3.2 per cent of class 4.			

The number remaining of class 4 at the end of the year, in which there is no longer any prospect of recovery is 45 men, 40 women, total 85; or 27.6 per cent of class 4.

* Evidently the reporters combined a proportion of class 2 in class 3.

BUFFALO STATE HOSPITAL.

Reported by Dr. WALTER H. CONLEY, Third Assistant Physician.

	Men.	Women.	Total.
1. Number transferred from other hospitals, and from county almshouses.....	3	25	28
2. Number received upon new commitments of such cases as had become chronic before commitment.....	21	38	59
3. Number received suffering from degeneracies of all kinds, and all cases showing irreparable organic change.....	68	21	89
4. Number received suffering from systematized insanity, in which the duration had not been sufficient to establish a degeneracy, and in whom recovery was logically possible.....	109	133	242
5. Recoveries resulting from class 4 within the year.....	38	26	64
6. Number of class 4 discharged "not recovered," but in which recovery might be expected...	9	15	24
7. Number of class 4 still remaining under treatment in which recovery is anticipated.....	39	56	94
8. Number of class 4 who have died before the close of the year			
(a) as the result of insanity.....	2	5	7
(b) from other causes.....	3	3	6
Number admitted as inebriates (not insane)....	7	1	8
Number of epileptics admitted*.....	9	1	10

From the above data it will be seen that there were admitted to this hospital for the year ending Sept. 30, 1895, 436 patients. Of this number 242 were of class 4. The following are percentages computed on (1) the total number of admissions, and (2) the number belonging to class 4.

The total number of admissions were 436, of which there were discharged recovered 64, or 14.7 per cent; discharged recovered and discharged improved with probable recovery 88, or 20.2 per cent; discharged recovered and improved, and those remaining where recovery is anticipated 183, or 42 per cent.

The total number of class 4 was 242, of which there were discharged before the close of the year 64, or 26.4 per cent; discharged recovered and improved 88, or 36.3 per cent; discharged recovered and improved, and those remaining in which recovery is anticipated 183, or 75.6 per cent.

* These properly belong in class 2 and 3.

WILLARD STATE HOSPITAL.

Reported by Dr. H. P. FROST, First Assistant Physician, and Dr. S. F. MELLEN,
Second Assistant Physician.

	Men.	Women.	Total
1. Number transferred from other hospitals and county almshouses for care—being chronic cases	21	56	77
2. Number received from homes under new commitments—chronic cases	39	77	116
3. Number suffering from degeneracies, hereditary and acquired of a constitutional nature, including cases of senile dementia	42	14	56
4. Number of acute cases in which when admitted, recovery was logically possible	51	48	99
5. Discharged recovered before close of year of those admitted during the year, of class 4..	13	17	30
6. Discharged "not recovered" of those admitted in class 4, but in which recovery might be expected	2	5	7
7. Of class 4, the number still remaining under treatment in which recovery is anticipated..	22	20	42
8. Number of class 4 who died before close of year			
(a) as a result of insanity..	1	1	2
(b) from other causes	3	5	8

BINGHAMTON STATE HOSPITAL.

Reported by Dr. ROBT. G. WALLACE, Second Assistant Physician.

	Men.	Women.	Total
1. Number who were transferred from other hospitals and from county almshouses, being chronic cases			14
2. Of cases received under new commitment from the community (homes) where the insanity was of long standing, (chronic cases)	12	10	22
3. Number admitted suffering from degeneracies (constitutional) and all cases showing irreparable organic change	42	38	80
4. Number admitted in the acute stage (systematized insanities) in which the duration had not been sufficient to establish a degeneracy and where recovery is logically possible....	61	41	102
5 Recoveries resulting from class 4 within the year	21	13	34
6. Number of class 4 discharged "not recovered" but in which recovery might be expected...	9	8	17

	Men.	Women.	Total.
7. Number of class 4 still remaining under treatment in which recovery is anticipated.....	28	16	44
8. Number of class 4 who have died within the year, and of such the number whose death was (a) the result of insanity, 3, and (b) whose death resulted from other causes, 4..	4	3	7

ROCHESTER STATE HOSPITAL.

Reported by Drs. POTTER, LAMOURE and BALLANTINE, Assistant Physicians.

	Men.	Women.	Total.
1. Number transferred from other hospitals and county almshouses.....	1	31	32
2. Cases received under new commitments from the community when the insanity was of long standing, (chronic).....	26	16	42
3. The number suffering from degeneracies of all kinds.....	27	16	43
4. Acute forms in which the duration had not been sufficient to establish a degeneracy....	32	36	68
5. Recoveries resulting from class 4.....	8	13	21
6. Discharged "not recovered" in which recovery might be expected.....	8	6	14
7. Number of class 4 still under treatment in which recovery is anticipated.....	7	3	10
8. Number of class 4 who have died			
(a) as a result of the insanity.....	1	1	2
(b) from other causes.....	1	1	2

MATTEAWAN STATE HOSPITAL.

Reported by Dr. R. D. LAMB, Second Assistant Physician.

	Men.	Women.	Total.
1. Number of cases received from the hospitals and almshouses, (chronic).....	6		6
2. Cases received from homes, (chronic).....	23	1	24
3. Cases in which prognosis is unfavorable.....	21	2	23
4. Cases logically recoverable.....	87	3	90
5. Cases admitted during the year and discharged recovered.....	18	1	19
6. Cases admitted during the year and discharged improved.....	1		1
7. Cases remaining under treatment in which recovery is anticipated.....	32	2	34
8. Number who died			
(a) as a result of the insanity.....	2		2
(b) from incidental physical disease.....	2		2

ST. LAWRENCE STATE HOSPITAL.

Reported by Dr. W. L. BABCOCK, Assistant Physician.

	Men.	Women.	Total.
1. Transferred from other hospitals and almshouses, as per question No. 1.....	106	22	128
2. Number received under new commitments but cases of long standing, as per question No. 2.....	22	20	42
3. Number received degenerate, as per question No. 3.....	74	43	117
4. Number admitted with true insanities, as per question No. 4.....	91	73	164
Not insane.....	4	1	5
5 Recoveries of class 4 before the close of the year.....	24	18	42
6 Discharged improved as per question No 6..	6	7	13
7. Remaining under treatment of class 4, as per question No. 7	28	24	52
8 Deaths from class 4 during the year			
(a) as a result of the insanity.....	2	3	5
(b) from other causes.....	4	2	6

SUMMARY.*

1. Total number reported as admitted, being transfers from other State hospitals and from almshouses, all chronic cases	493
2 Total number of new commitments, but cases of long standing and presumably chronic.....	474
3. Total number admitted suffering from degeneracies, as per question No. 3 and presumably incurable.....	716
4. Total number of acute cases received, in which recovery is an expectancy, as per question No. 4.....	1142
5. Recoveries resulting from class 4 within the year.....	310
6. The number of class 4 discharged within the year as "not recovered" but in which recovery may be expected..	141
7. The number of class 4 still remaining under treatment in which recovery is anticipated.....	403
8. The number of class 4 who have died	
(a) as a result of the insanity.....	41
(b) from other causes.....	40

No further computation is necessary to illustrate the fallacy of the ordinary statistical tables showing results of treatment. Thus it is shown that 493, or seventeen per

* On account of the difference in class of the cases received at the Matteawan State Hospital, its data are omitted from the summary.

cent of the number reported as admitted to the several hospitals, is a shifting population that may figure as admissions from time to time, without being out of hospital custody. It is also shown that of those first received and figuring in the admissions, forty-two per cent are recognized as cases beyond the hope of recovery at the time of their admission.

The restoration to a full measure of health is not the only function of an insane hospital, and we are far from desiring to depreciate the great results that are obtained in the mitigation of disease and the lessening of suffering through the humane methods adopted. To answer criticisms however, that appear founded on raw figures, one must deal in kind. It is an ordinary saying that figures will not lie, but in the hands of the ignorant, the careless, the indiscriminating, they become most potent instruments of falsehood.

The data presented herewith are dependent upon the discrimination and personal judgment of one person, usually, and in this respect are subject to error. It would then seem a reasonable proposition to reduce error, or at least prevent erroneous conceptions, by avoiding data that are based upon a personal estimation, in which men may differ widely; and this can be in great part corrected, by substituting for such means of information, the absolute facts of individual data, leaving to the reader and inquirer to base his conclusions thereon. In the matter of recoveries this is not wholly possible, but it would apply to other matters of statistical information usually presented in hospital reports.

TABLE NO. I. ADMISSIONS OF WOMEN FOR THE YEAR ENDING SEPT. 30, 1895.

Case No.	Date of Adm.	Assigned Cause of Insanity.	Form of Insanity.	No. of Adm.	Hereditary Tendency	Civil Condition.	Degree of Education.	Durat'n Prev. ious to Adm.	Age	Occupation.	Nativeity.
1891	1 Jan. '95.	Uterine displacement.	Acute melancholia.	1	o	Sing.	Common school.	2 months.	23	Servant.	U. S.
1893	1 "	Poor health.	Chronic melancholia.	1	Maternal branch.	Mar.	Common school.	2 months.	59	Housewife.	Ireland.
1900	11 "	Climacteric.	Ac. delirious mania.	1	o	Wid.	Common school.	2 days.	51	"	N. Y.
1903	14 "	Epidemic influenza.	Acute mania	1	o	Mar.	Common school.	10 weeks.	30	"	State.
1905	17 "	Nervous temperament and worry.	Acute melancholia.	1	Unknown.	Mar.	Academic.	1 1/4 years.	49	"	N. Y.
1906	17 "	Climacteric.	Chronic melancholia.	1	Unknown.	Mar.	Reads only	2 years.	50	"	U. S.
1911	23 "	Injury to head.	Dementia.	1	o	Sing.	Common school.	32 years.	57	None.	Ireland.
1913	25 "	No known cause.	Chronic melancholia.	1	o	Sing.	Common school.	1 year.	30	Nurse.	N. Y.
1921	30 "	Senility.	Senile dementia.	1	o	Wid.	Common school.	3 years.	82	Housewife.	State.
1922	30 "	Senility and worry.	Senile dementia.	1	o	Wid.	Unknown.	Unknown.	73	Housek'per.	N. Y.
1923	30 "	Senility.	Senile dementia.	1	Unknown.	Wid.	"	Unknown.	74	Housek'per.	Ger-many.
1928	11 Feb. '95.	No known cause.	Acute mania	1	o	Mar.	"	6 months.	33	Housewife.	Ireland.
1929	11 "	Epilepsy.	Dementia (epileptic.)	2	Maternal branch.	Mar.	Academic.	3 1/4 years.	33	"	Canada.
1930	16 "	Uterine disease.	Chronic melancholia.	1	o	Mar.	Common School.	2 years.	38	"	N. Y.
1931	16 "	Nerv. temp., poverty and worry.	Acute melancholia.	1	Sister.	Mar.	Unknown.	6 months.	32	"	Canada.
1932	19 "	Uterine disease suspected.	Acute melancholia.	1	o	Mar.	Unknown.	3 1/4 months.	29	Housek'per.	Ger-many.
1933	20 "	Defective development.	Imbecility.	1	Sister.	Sing.	Common School.	Unknown.	42	Servant.	Canada.
1934	20 "	Hereditary inebriety.	Dementia.	1	Paternal branch.	Mar.	Reads only	1 1/4 year.	42	Housek'per.	N. Y.
1935	22 "	Injury to uterus in labor.	Chronic mania.	1	o	Mar.	Unknown.	3 years.	39	Housewife.	State.
1937	25 "	Overwork and insomnia.	Acute delirious mania.	1	2 sisters.	Wid.	None.	4 days.	53	Housek'per.	Canada.

TABLE No. 2.
ADMISSION OF WOMEN DURING THE YEAR ENDING SEPTEMBER 30, 1895.

Case No.	Date of Adm.	PHYSICAL CONDITION ON ADMISSION.																											
		g	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	R	S	SI	Sp	T	U	V	W	Wa	Wc	X	Z
1891	1 Jan.	23	S	1	1	1	1	1	O	2 m	Me A	O	S 1	F	100 R	D	L 1	N	F	I	AC	98.2	200	S	1	N	A	1	R.4 Mr.
1893	1 Jan.	59	M	2	2	2	2	2	M	2 m	Me C	31	S 5	Fe	100 Fe	DC	L 2	C	R	I	IV	99	1	U	N	B	1	Im. Rd.	
1900	11 Jan.	51	W	2	3	1	1	3	O	1 w	MA	O	?	Fe	84 R	C	M 1	C	R	D	IV	99	107	S	1	N	B	2	R 5 Ap.
1903	14 Jan.	30	M	2	3	1	1	6	O	10 w	MA	O	?	Fe	84 R	C	M 1	C	R	D	IV	99	107	S	1	N	1	2	R 20 Je.
1905	17 Jan.	49	M	2	2	1	2	1	?	18 m	Me A	O	?	Fe	100 Fe	DC	M 2	C	R	D	IV	99	107	S	1	N	1	2	Un.
1906	17 Jan.	50	M	2	2	1	2	1	?	2 y	Me C	91	S 4	Fe	100 Fe	DC	M 2	C	R	D	IV	99	107	S	1	N	1	2	Un.
1911	23 Jan.	57	S	3	3	1	2	3	O	32 y	Me C	O	?	Fe	100 Fe	DC	M 2	C	R	D	IV	99	107	S	1	N	1	2	Un.
1913	25 Jan.	30	S	3	3	1	2	3	O	17 y	Me C	O	?	Fe	80 R	C	L 2	C	R	D	IV	98.8	111	S	1	N	1	2	Un.
1921	30 Jan.	82	W	2	3	1	1	9	O	3 y	DS	31	4 d	Fe	72	N	L 2	C	R	D	IV	98.4	102	S	1	N	2	3	Un.
1922	30 Jan.	73	W	2	3	1	1	9	O	3 y	DS	31	4 d	Fe	64	N	L 2	C	R	D	IV	98.4	102	S	1	N	2	3	Un.

B—CIVIL CONDITION. S—Single. M—Married. W—Widowed. D—Divorced. U—Unascertained.

C—OCCUPATION. 1—Servant. 2—Housewife. 3—Nurse.

D—NATIVITY. 1—U. S. 2—Ireland. 3—New York. 4—Germany.

E—DEGREE OF EDUCATION. 1—Common School. 2—Academic. 3—Collegiate. 4—Reads only.

F—NO. OF ADMISSION.

G—ASSIGNED CAUSE OF INSANITY. 1—Uterine disease. 2—Ill-health. 3—Climacteric. 4—Bereavement. 5—Financial reverses. 6—Epidemic influenza. 7—Overwork and anxiety. 8—Injury to head. 9—Senility.

H—HEREDITARY TENDENCIES. O—None ascertained. M—Maternal branch.

I—DURATION PREVIOUS TO ADMISSION. W—Weeks. M—Months. Y—Years.

J—FORM OF INSANITY. MA—Mania Acute. Me A—Melancholia Acute. MC—Mania Chronic. Me C—Melancholia Chronic. D G—Delirium Grave. D—Dementia Terminal. DS—Dementia Senile.

K—No. CHILDREN. 1—Living. d—Dead. y—Age of youngest.
 L—TENDENCIES. H—Homicidal. S—Suicidal. C—Criminal. 1—Poison. 2—Asphyxia. 3—Mutilation. 4—Drowning. 5—Threatened only.
 M—STRENGTH. S—Strong. F—Fair. Fe—Feeble.
 N—PULSE. R—Regular. D—Dicrotic. 1—Irregular. Fe—Feeble.
 O—TONGUE. D—Dry. C—Coated. F—Fissured. N—Normal.
 P—EYES. L—Light. M—Medium. D—Dark. 1—Pupils dilated. 2—Pupils contracted. 3—Unequal, r—right, l—left.
 R—BOWELS. N—Normal. C—Constipated. L—Loose. 1—Irregular.
 S—APPETITE. G—Good. F—Fair. P—Poor. R—Refuses food.
 SI—SLEEP. R—Regular. 1—Irregular. D—Deficient. E—Excessive.
 Sp—SPEECH. O—Non. A—Answers questions. C—Coherent. G—Garrulous. I—Incoherent. T—Thick. V—Volatile.
 T—TEMP.
 U—WEIGHT.
 V—GAIT. S—Steady. U—Unsteady. A—Ataxic. L—Lame.
 W—HEART. 1—Tachycardia. 2—Murmur. 3—Dilatation.
 Wa—LUNGS. N—Normal. 1—Apex consolidated. 2—Puerile.
 Wc—SKIN. A—Acne. B—Bruised. C—Limbs oedematous.
 X—ACCOMPANYING DISEASES. 1—Graves' disease. 2—Pulmonary Consumption. 3—Deformities, osseous.
 Z—CONDITION OR RESULT ON JAN. 1, 1896. R—Discharged recovered (followed by date). 1—Disch. improved. U—Disch. unimproved.
 Di—Died. Im—Improving. Un—Not improving. Rd—Retains delusions.

A FEW CASES OF INTEREST IN GYNECOLOGY IN RELATION TO INSANITY.

BY HELENE KUHLMANN, M. D.,
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The question of the relation of disease of the pelvic organs to insanity has been considerably discussed within the past few years, some observers ascribing every case of insanity in woman, directly or indirectly, to disease of the organs of generation, while others disclaim any connection between the two. Both views are obviously extreme and false.

That there must be an intimate connection between the healthy or diseased state of the pelvic organs and the general bodily health can readily be understood, when we consider the far-reaching distribution of the sympathetic system of nerves, which so profusely supplies them and sends its branches into almost every organ of the body, intertwining with the branches of the cerebro-spinal system. On the other hand we must not forget that in many, in fact the majority of cases, any existing local trouble merely constitutes a contributing factor in the symptom-complex and would probably have remained in the background had not the general health suffered through deprivation, worry, shock, etc., or had not a bad heredity asserted itself.

A great many of the cases of insanity in women occur at the critical period of life, at the age of puberty, during the puerperal period and the climacteric.

Of the 752 women patients admitted to the State Hospital during the past three years, I find 12 cases of adolescent insanity, and 48 cases of puerperal insanity. On analyzing these latter further into the four periods made by Régis, we find that five developed during pregnancy, 33 during the puerperal period, five were ascribed to excessive lactation and none occurred at the time of labor.

Of the adolescent cases, a few were of special interest. Six were cases of acute mania, in whom the exciting causes were respectively worry, overwork and ill health, operating at a time when the nervous system is peculiarly impressible

to morbid influences, owing to the profound changes incidental to puberty. In five the heredity was good, while one had an insane paternal uncle. All made good recoveries.

The amenorrhœa which existed in these cases disappeared under a general tonic treatment. No emmenagogues were given. Five have remained permanently well, while one has suffered from a relapse. There were four cases of subacute mania. Of these two had a good heredity, one was unascertained and the mother of one of the patients had committed suicide. Two of these recovered, but one had a relapse a year later. Two are much improved and will probably recover but are still under treatment. One of these cases is of some interest on account of the comparative rarity with which it is met.

M. J. æt. 19, had an attack of adolescent insanity when 17; cause supposed to be suppression of the menses due to a chilling, but in reality was the result of ill health and overwork in a factory. She was anæmic and generally below par. Under tonic treatment the general health improved, the menses returned and she made a good recovery. A year after her discharge she was returned to the hospital, being then in a condition of secondary dementia, following a brief period of mental depression. Remained in this condition for six months, when she developed symptoms of katatonia, lay in one position on the back, with closed eyes and body rigid. Limbs would remain in any position in which they had been placed for long periods at a time. She reiterated a certain sentence in Swedish continually, and when asked a question, would repeat this same sentence over and over again.

Spitzka states that he believes that some of his cases derived a certain amount of enjoyment from these verbiagerations and this certainly appeared to be the case in the present instance. There was a slight degree of general anæsthesia. The patient refused food and medicine for a number of days and during the remainder of the time that the condition lasted took only a small amount of nourishment. The katatonic condition continued for three weeks when she passed into a condition of excitement, being noisy, profane, mischievous and extremely untidy in habits. After this had lasted for about six months she became more quiet

and self-controlled and is now practically well. The catamenia were absent until a short time after the mental improvement commenced. The pelvic organs were found to be perfectly normal, although her friends believed that there was existing local trouble.

Of the remaining two, one is a case of dementia, which developed at the age of puberty after a short period of excitement in a case with a very bad heredity. The other is a similar case as regards heredity, and is suffering from subacute melancholia with beginning dementia.

It will thus be seen that of the twelve cases admitted, eight have recovered and two are likely to recover, showing that the adolescent form is fairly curable, although relapses are liable to occur in later life, in case any unusual strain is put upon the nervous system. In those cases, however, with a bad heredity the acute attack is apt to be short and dementia supervenes early. They are the hopeless cases.

In trying to solve the question as to whether puerperal insanity is an infection psychosis or whether a normal puerperium can, *per se*, induce a condition of mania or melancholia we are confronted with the many incomplete histories which we necessarily obtain. A few cases are undoubtedly due to infection, but the majority arise from causes some of which have already been mentioned, and the puerperium merely constitutes a lowered standard of health and thus allows the mind to be more early impressed.

Gorski states that of 133 cases, 21 began during pregnancy, 55 during parturition and 57 during lactation, which is a somewhat different proportion than occurred here. Ohlshansen classifies his cases as follows:

1. Infection psychoses directly dependent upon puerperal infection.
2. Idiopathic psychoses.
3. Intoxication psychoses.

The last variety appears to be the least common.

I find only one typical case in the present series, namely, a case following eclampsia:

Mrs. McL., æt. 44, mother of eight children, seven of whom are living; has always been in excellent health, labors have all been normal,

no difficulty during puerperium. On June 1st, 1894, about a week before confinement, had three convulsions, with loss of consciousness, preceded by blindness and intense headache. Immediately afterward she became confused, mistook the identity of people around her, did not know where she was, insisting upon going home when she was in her own apartments, had marked hallucinations of sight and hearing, thought that she was followed by men and showed considerable violence. On her admission to the hospital on June 5th, she was markedly confused, presented considerable loss of memory and essentially the same delusions as stated. Examination of a specimen showed the urine markedly decreased. Urea decreased in amount, a trace of albumin, marked increase of urates. No casts were found. Had a slight morning and evening rise of temperature, for which no cause could be assigned. She was immediately put on diuretics and a milk diet. On June 15th a baby boy was born, weighing eight pounds, labor easy, no complications, no rise of temperature during puerperium. Five days after labor was still somewhat confused but able to correct her hallucinations. Twelve days after labor was entirely clear mentally and remained so.

Considering the infection psychoses next, I find only two cases that in my estimation can be strictly classed as such. Both were young married women, primiparæ, suffering when admitted from acute mania.

Mrs. M. G., æt. 22, was admitted three days after confinement. Pregnancy had been normal, except that she was noticed to be a trifle nervous during the last few days. Labor was normal. Two days after confinement she became excited, noisy, saw people in the room, under the bed, and developed marked homicidal tendencies. She was markedly exhausted, anæmic and feverish, temperature on admission being 100.6, pulse 100. There was some odor to the lochia. Treatment consisted in intra-uterine and vaginal irrigations, tonics, and a stimulating diet, and in three weeks she had given up her delusions and was in a very fair physical condition. She was discharged a week later, being according to her husband's statement in her normal condition.

A peculiarity in this case was that although the local condition was normal during the last week of her stay in the hospital, there was a slight daily evening rise of temperature to 99°, which she claimed had existed for the past three years, dating from an attack of typhoid fever, but which was more likely caused by the anæmia. The second case, Mrs. S. G., was similar to the preceding, except that there was not such a high degree of anæmia.

The remaining cases can more properly be classed as idiopathic psychoses, occurring during pregnancy or between three weeks and two to three months after confinement during the period of lactation. One of these was complicated with cystitis.

Patient was a primiparæ, æt. 32, admitted twenty-four days after confinement. She was sallow, anæmic and generally very much below par. The pelvic organs were normal. The relief of the cystitis by irrigation, etc., in addition to general measures brought about a complete cure.

Although puerperal insanity, if seen early, is one of the most favorable forms as regards prognosis, a certain number of these patients suffer from nervous disturbance at each subsequent birth, the nervous system having apparently become vulnerable to this certain influence. One of the cases recovered her mental health after a subsequent pregnancy, which appears to be rather a rare occurrence.

Mrs. H. K., æt. 37, mother of five children, suffering from melancholia of one and one-half years' duration, dating from the birth of her last child. On admission she was very much depressed and stupid, with loss of memory and occasional periods of disturbance due to fear of impending trouble. During the puerperium she presented the usual homicidal tendencies toward her child, which soon passed off and she subsequently became cheerful, industrious, fond of her child and was discharged as recovered.

In another case, that of Mrs. E. G., suffering from a similar condition, confinement had absolutely no influence on the mental condition. In fact it has been proved to be the rule that excessive lactation can only be regarded in the light of a factor producing a general ill-health, making the mother's system more susceptible to abnormal influences of any kind.

Considering now the local condition found in cases of insanity, we find that by far the most common lesions are rupture of the perineum and retromisplacements of the uterus, while in a smaller number are found the various lateral versions. In my own experience ovarian and tubal disease has been of rare occurrence. Of course there is always a certain number of patients who refuse to be ex-

amined, so that this may not be an exact estimate, but the majority of cases in whom any abnormality was suspected were submitted to an examination. That a local lesion is often merely incidental is shown by the fact that many cases with marked lesions, who obstinately refuse to submit to treatment, recover perfectly notwithstanding the local trouble.

Of a series of one hundred cases, thirteen per cent had a retroversion, complicated or not with endometritis, although in a number of these there was only a slight deviation from the normal axis. Six per cent suffered from retroflexion. Many of these were greatly benefited by local measures. One of the cases presented a curious condition, which was apparently congenital.

Mrs. E. C., æt. 35, married, suffering from sub-acute mania; has had no children, but has had two miscarriages. On examination the perineum was found intact, uterus small, retroflexed. Cervix of normal length, the anterior surface being united to the anterior wall of the vagina, to within one-quarter inch of the os. No inflammatory bands were present, both broad ligaments being normal and there was no evidence of endometritis.

This condition was evidently responsible for the occurrence of the miscarriages, but did not give rise to symptoms of local discomfort and apparently had nothing to do with the mental trouble.

The following case was, I believe, caused directly by disease of the pelvic organs:

Miss S. R., æt. 30, single, has been suffering from sub-acute mania for two and a half years. Her delusions are all of an erotic nature and she is very much disturbed and homicidal at the menstrual periods, the flow being very profuse. The patient absolutely refuses to be treated and an operation proposed to the friends has been denied. I feel confident that in this case the correction of the local trouble would result in marked benefit to the patient's mental and physical condition. I have met with five cases of lateral version which appeared to be congenital and evidently had nothing to do with the insanity.

Endometritis is rather common, especially during the early debilitated period. A number of these cases are apparently the result of a lithæmic condition, which is so commonly found among the insane.

The following case can properly be regarded as a lithæmic endometritis:

Mrs. O'M., æt. 50, suffering from acute melancholia. Had a very irritating leucorrhœal discharge. No other local lesion. The urine was decreased, of a high specific gravity, and laden with urates and uric acid. Upon correcting this condition, the endometritis improved and with it the patient's physical and mental condition.

Fibroid disease appears to be comparatively rare among the insane, only three cases having come under my observation. In two of these the tumor was small but the third was of large size and deserves further mention.

Mrs. F. S., æt. 33, was admitted to the hospital suffering from melancholia, of two years' duration. Physical condition was extremely poor. She was thin, sallow, almost cachectic, with rapid pulse, and had a hectic temperature, in fact presented a condition bordering on *in extremis*. She was depressed, had marked hallucinations of sight and hearing, saw a dagger suspended above her head and had developed marked delusions against all her family. Examination revealed a large fibroid of the uterus, reaching to the umbilicus, which evidently was responsible for her mental condition. After she had recuperated sufficiently to endure an operation, total hysterectomy was performed and the patient made a good mental recovery one year after operation.

There have been a few cases of tubal and ovarian disease but the percentage has been small. Only one of these is of sufficient interest for report:

Mrs. F. R., æt. 30 years, with acute melancholia, has an irregular menstrual history, with considerable dysmenorrhœa. For several years has been troubled with convulsions, probably of a hysterical character, at the menstrual periods. Much pain in the inguinal region and leucorrhœa. Examination was extremely painful. There was prolapse and enlargement of the right ovary and slight enlargement of the left. Right tube was slightly swollen. Under complete rest in bed, and local treatment, combined with general tonic measures, the local symptoms entirely disappeared. The last three menstrual periods have been free from pain and the patient is gaining rapidly in every way.

I have been unable to obtain any statistics as to the menstrual history of patients admitted, owing to the unreliable statements, the result of loss of memory. Neither have I found that local disease gives any particular character to the mental symptoms. I have found patients in

whom the pelvic organs were perfectly normal, who had marked erotic delusions, while with extensive local lesions none would be found. The majority of the insane are more disturbed at the menstrual periods, which is merely an exaggeration of the increased irritability found in sane persons at this period.

In looking for reflex causes we must not forget that in many cases where the symptoms are apparently referred to the generative organs, the true seat of the trouble is in reality in the rectum or bladder, such as a fissura ani, a cystitis or urethral caruncle, etc., and by removing these we cure our patients of the referred sensations.

In conclusion I would say that whatever our opinion, whether we consider gynecological lesions as having any causal relation to insanity or not, the fact remains that these lesions, if sufficient to interfere with the general health, should be corrected as far as possible. And this duty falls as much upon the general practitioner as upon the specialist, for many of the patients who from a traditional prejudice, or, owing to the nature of their delusions, refuse to be treated in an institution, will submit to it outside and thus a relapse might in some cases be prevented.

CEREBRAL LEPTO-MENINGITIS IN THE INSANE.

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Lepto-meningitis in the insane is a rare disease, and as a cause of insanity it is still more rare. Upon September 30th, 1895, there had been admitted to the Hudson River State Hospital since its opening, in 1871, 7,048 cases—but only 6,234 persons—814 being re-admissions. The number of cases of lepto-meningitis occurring in the hospital has been 8, and the number of cases of

insanity caused by this disease has been 3. Of the 8 cases of lepto-meningitis, 3 were men and 5 were women. The forms of insanity given in the 8 cases were:

Acute mania.....	1	man	and	2	women.
Sub-acute mania.....	1	"	"	0	"
Acute melancholia.....	0	"	"	1	woman.
Agitated ".....	0	"	"	1	"
Dementia.....	1	"	"	1	"

The causes of insanity given in the eight cases were: Men: one meningitis, one senility, one over work and intemperance. Women: one loss of work, one masturbation, one influenza and two unknown. Heredity existed in the case of one man, and was unascertained in all the others.

The average age for the eight cases is 47. The youngest was 23, and the oldest was 69. The average age for the men is a fraction over 47—the youngest was 36 and the oldest was 69. The average age for the women is a fraction over 46—the youngest was 23 and the oldest was 64.

It is not my purpose to consider tubercular and cerebro-spinal meningitis in this article—only inflammation of the pia-arachnoid, and this principally from a causal standpoint. Lepto-meningitis, then, is either acute or chronic in character, and either simple or purulent in nature. Only the membranes of the convexity may be affected or only those of the base; occasionally both those of the convexity and base are involved, while sometimes the inflammation extends to the ventricles and sets up an ependymitis. In the cases under consideration the disease was distributed as follows:—convexity alone, 4 cases; convexity and ependyma, one case; convexity, base and ependyma, one case; no autopsy in two cases, but judging from the symptoms given in each case, I would say that the convexity in each was affected.

The most common causes of this disease are (1) extension of inflammation from the ear, (2) traumatism, (3) disease of the mastoid cells, (4) affections of the nose, (5) inflammation of the eye, (6) infectious diseases, such as diphtheria, acute articular rheumatism, typhoid fever, and

pneumonia—the last mentioned probably ranking foremost as an infectious disease. Pneumonia and meningitis are closely allied since the *pneumococcus* of Fraenkel is found in both diseases, and according to the latest authorities the same organism is found in pleurisy. Dr. Egbert LeFevre in an article on the “Significance of Pleurisy,” etc., (*N. Y., Medical Record*, Feb. 8, 1896) says:—“Many of the investigators who have studied these cases of acute, non-tuberculous pleurisy from the bacteriological side, claim that the majority are due to the pneumococcus of Fraenkel. Jakowski studied fifty-two cases and found that 70% were caused by the pneumococcus, while out of Netter's 46 cases, 40 were due to the same organism I think it must be conceded that it is possible to have the pleura invaded by the pneumococcus without any lung involvement.” If then, such is the case, the question naturally arises, how do these organisms gain access to the serous surfaces of the thoracic cavity and yet not attack the lungs? The question may be answered by a consideration of the lymphatic system. According to Landois and Stirling, the cavities of the peritoneum, pleura, pericardium, tunica vaginalis testis, arachnoid space, aqueous chambers of the eye and the labyrinth of the ear, are all true lymph cavities. And again the open pores on some mucous membranes are considered as the origin of the lymphatics,—as the nasal mucous membrane and tonsils. Both the sub-dural and sub-arachnoid lymphatic spaces communicate with those of the nasal mucous membrane, and with those in the spongy bone of the skull and with the veins of the skull and surface of the face.

If the pneumococcus can gain access to the pleura through the lymphatics (supposedly the tonsils) and cause an inflammation, why cannot the same organism gain access to the serous cavity of the skull and set up a meningitis? I believe that such is the case and that the portals of entrance for infectious germs and pyogenic organisms are,—the nasal mucous membrane, the veins of the skull and surface of the face, and the lymphatic connection between the spongy bone of the skull and its cavity. Dr. Gowers says that

morbid processes affecting the scalp, ear, or face may readily affect the intra-cranial structures. It is a well known fact that in scrofula we have a tubercular process which may affect all or part of the lymphatic system,—and frequently the bronchial and mesenteric glands are found, at autopsies, to be tubercular when no signs or symptoms of tuberculosis have been discovered during the life of the subject. Nearly all serous surfaces, especially those of the pleura and pia-arachnoid, have a special tendency to spontaneous inflammation,—consequently those membranes are more liable to be affected by pyogenic organisms. According to Dr. Gowers the pia-arachnoid is the seat of specific processes more frequently than any other serous membrane, and the tendency to formation of pus is greater in the skull cavity than in the case of the pleura or pericardium,—and the *diplococci pneumoniae* have been found chiefly in the lymph spaces of the pia-arachnoid.

In middle ear disease the inflammation may not only pass to the brain through the peri-lymph spaces and nerve sheaths, but by the superior petrosal sinus which receives blood from both the roof of the tympanum and from the brain. So in mastoid cell disease, the infection may be carried by the lateral sinus which receives blood from both the cells and the brain.

Acute articular rheumatism, as a cause of lepto-meningitis, can be understood when we consider that it is an infectious disease and that it attacks the various joints which are bathed in synovial fluid secreted by the serous membranes covering the joints—and that this fluid must be looked upon as being lymph as much as the fluids of other cavities which have been mentioned.

Drs. Holt and Van Gieson, in the *Journal of Nervous and Mental Disease*, December, 1890, report a case of spina bifida complicating suppurative inflammation of the wall of the sac, with purulent spinal meningitis which extended into the central canal, causing a suppurative ependymitis of the lateral and third ventricles with exudative cerebral meningitis. In this case the pyogenic bacteria entered the sac through the exposed surface of the skin.

In the cases given below I shall attempt to demonstrate the applicability of the foregoing remarks:

CASE No. 4890. Female, age 40, no occupation. Complexion light, eyes blue. Born in New York. Habits good; heredity denied; common school education. Exciting cause, masturbation; diagnosis, dementia; duration, 12 years. Upon admission: Temperature normal, pulse 84, tongue clean, bowels constipated, appetite good, pupils normal, menstruation irregular. Restless and uneasy, confused and incoherent. Mind very much reduced and could get no intelligent answers from her. No local trouble discovered, but was a confirmed masturbator. Said to have had an otitis when a girl. This patient did not give any evidence of mental improvement while under treatment, but was often destructive of clothing, filthy in habits and without interest in her surroundings. Upon March 3d, 1895, almost three years after admission, she had a slight discharge from the right ear. Examination showed the discharge to be purulent in character and the ear drum completely destroyed. Patient, on the morning visit, was quiet and placid,—up and about the ward and made no complaint whatever. The right side of the face was more flabby than the opposite. Pupils apparently normal. About 2 P. M. she began to complain of pain in the head and right ear, grew restless, vomited, rolled her eyes, and the fingers of both hands were flexed. The thumbs were adducted and pushed out between the fore and middle fingers, and there was twitching of the muscles of the hands and of the arms, at intervals. Temperature 102° F., pulse 120, respiration hurried. She suffered from flashes of heat followed by profuse perspiration, and then, in turn, the surface of the body would become cold and clammy. She rolled from one side of the bed to the other and groaned, as if in great agony. When asked if in pain she said, "In my head, take it out!" Prostration marked. Temperature at 11.45 P. M. 104.2° F.

March 4th. Did not rest very well during the night and had no control of the sphincters. Had flashes of heat over the body followed by profuse perspiration. Complained of severe pain in the head. Coughed at times, but physical examination did not reveal any lung complication. There was twitching of the muscles of the hands and of the arms, and the muscles of the neck were slightly rigid. Temperature ranged from 103.4° F. to 104° F. and pulse from 120 to 140.

March 5th. Restless during the night, notwithstanding sedatives were given in large doses. Temperature at 6 A. M. 104.2° F., respiration 40, pulse 112. Had to be held in bed at intervals owing to extreme restlessness. During the night she would constantly pick at the bedding, roll her eyes, jerk her hands, and throw herself from one side of the bed to the other. At 9.30 A. M. she went into convulsions which affected both the upper and the lower extremities. Convulsions continued until death, which took place at 9.45. A. M.

AUTOPSY.—*Brain.* There was a layer of pus over both cerebral hemispheres—covering convexity and base. Pus was more abundant along the fissures of Rolando and of Sylvius on the right side, and more abundant over the convexity of the left lobe than over the corresponding area of the right. The membranes peeled off from the brain substance with little difficulty, and were non-adherent, except over the ascending frontal and ascending parietal convolutions—and there, they were pulled off with difficulty, leaving the surface of the brain with a fine millet-seed-like appearance, (meningo-cerebritis). Both the pia and the arachnoid were closely bound together. Pus extended into all the convolutions and into the right lateral ventricle. Pus also covered both cerebellar hemispheres and some escaped from the spinal canal. Over the roof of the internal ear of the right side, the bone was softened and presented the appearance of caries. Pus was found in the internal auditory openings. Everywhere the pus was greenish and offensive in odor.

Heart.—In the pericardial sac there was about $1\frac{1}{2}$ ounces of serous fluid. Aside from a small ante-mortem clot in each ventricle the heart was normal. Most of the blood was fluid.

Lungs.—Posteriorly, presented hypostatic congestion and slight oedematous infiltration. *Kidneys.*—Normal in appearance. *Spleen.*—Congested, soft and friable. *Liver.*—Congested, somewhat fatty and would tear very easily. *Weight of the organs.*—Brain, $48\frac{1}{4}$ ozs.; heart, $7\frac{1}{2}$; liver, 56; spleen, 10; kidneys, $4\frac{1}{2}$ each.

This case presented symptoms of meningitis, in the most acute form, from the beginning and might be termed *fulminating* in character, and it was evident that both the convexity and the base of the brain were involved.

In connection with this case I wish to state a very singular occurrence and one that is very suggestive of the connection between meningitis and pneumonia, and, at the same time, refers to pleurisy and acute articular rheumatism. The case of lepto-meningitis just cited occurred in Cottage No. 1, which is situated on the south side of a large hill. From a sanitary point of view the location is a good one. In this cottage, on the morning of the 3d of March, 1895, there was discovered one other case of otitis, a recurrence of a previous attack, but in which there had been no discharge from the ear for several months. Before those two cases of ear trouble had developed there had been one case of acute pulmonary tuberculosis, which was diagnosed early in February, and one case of

pleurisy which developed on the 1st day of the month (March). The case of pleurisy complicated pneumonia on the 3d, the day that the two cases of ear trouble were discovered. Between the 3d and the 16th of the same month, seven cases of pneumonia developed in this cottage: 2 on the 3d, 1 on the 4th, 1 on the 5th, 2 on the 7th, and 1 on the 16th. On the 4th of the month the two cases of otitis and one case of acute articular rheumatism were transferred to Cottage No. 3, the location of which is similar to that of No. 1. The rheumatic case developed pleurisy on the same day (the 4th) and complicated pneumonia on the 5th. (Pleurisy often complicates acute articular rheumatism and had not pneumonia developed in the above mentioned case, it would not have been considered necessary to mention the case of rheumatism in this connection.) On the 20th of the month, in No. 3, seventeen days after the ear cases were admitted there, another case of pneumonia developed. No other case of pneumonia occurred in the service of over 380 patients. Surely the relation between meningitis and pneumonia is a very close one, and I believe that the case of meningitis, resulting from the otitis, was the cause of the small epidemic of pneumonia.

CASE No. 4671. Age 64, married, 6 children, housekeeper. Born in Scotland. Habits good; common school education. Diagnosis, acute melancholia; duration, 5 weeks. Predisposing cause, influenza; exciting, otitis. On admission, pulse was 80, temperature normal, tongue coated, appetite poor, pupils dilated. Physically very feeble and had suicidal tendencies. In March of this year (1891) she had an attack of influenza which complicated pneumonia. In August she began to talk of having been improvident and of having neglected her religious duties. She had hallucinations of sight and of hearing. Fancied that her friends had formed a conspiracy by which to get rid of her. She said that she would soon become "deaf, dumb and blind" and that balls of fire were flying from her eyes; that her brain "was a mass of irritated mucous membrane." She was restless and agitated. The day after admission she expressed the same ideas as mentioned, and said there was a knocking in her right ear. There was some anæsthesia of the scalp of the right side. On the 5th day after admission she was noted as having a right otitis media. On September 13th, eight days after her reception into the hospital, she was dull and inclined to sleep; was filthy in habits and had no appreciation of her condition. On the 14th, her left side was partially paralyzed, and

she was in a semi-comatose state. On the 15th, the coma deepened and tonic and clonic convulsions of the left side were present. She died at 3.45 P. M.

AUTOPSY.—*Brain* weighed 52 ozs. Upon opening the dura mater at the vertex there escaped about four ounces of sanious pus. The pia was infiltrated with pus over the convexity of the frontal and parietal lobes of the right hemisphere, and the underlying convolutions were compressed in consequence of the large amount of pus.

The autopsy record does not state the condition of the roof of the internal ear, but without doubt, the inflammation extended from the ear to the brain membranes, either by way of the nerve sheaths or through the peri-lymph spaces. As a result of the influenza and of the pneumonia from which the patient suffered last March, a latent disease of the ear set in, by extension through the Eustachian tube. Dr. Osler says that the *diplococcus pneumoniae* of Fraenkel "persists for months or even years in the saliva of persons who have had pneumonia. It occurs occasionally in the nose, the larynx, and the Eustachian tube." By way of parenthesis, I would remark, that had the patient known that "serous" and not "mucous" membranes covered the brain, she would have proven herself to be a good diagnostician!

CASE No. 4796. Admitted March 8, 1892; female, age 23, servant. Complexion dark, eyes blue. Born in Germany, one year in the U.S. Common school education. Diagnosis, acute mania; duration, two weeks.

Admission: Temperature 100° F., pulse 102, tongue dry and furred, bowels constipated, appetite poor, menstruation irregular. Suffered from insomnia. Skin dry; heart and lungs normal. Had a felon on the thumb, and one on the forefinger of the right hand. Restless and agitated, gesticulated wildly, attempted to destroy the furniture, and was confused and incoherent. Had hallucinations of sight and of hearing, and was very profane and vulgar in talk. In her attempt to escape from her imaginary enemies she tried to jump from the boat on her way to the hospital. For the first few months after admission she was noisy, hysterical in conduct, profane in language, negligent and filthy in habits. Periods of excitement would alternate with spells of depression, and in those melancholy moods she would attempt to injure herself—would pull her hair, strike her head against the walls and throw herself to the floor. In October of the same year (1892) she showed a slight improvement, but that lasted only a few days when she became noisy, excited, refused food and suffered from

auditory and visual hallucinations. On January 7th, 1893, she had an onychia beginning on the left ring finger. On the 28th she took to bed with a temperature of 102° F., pulse 120, and there was a general tremor of the muscles of the upper and of the lower extremities, and she was dull and listless. On the 30th she was restless and tremor continued. In her attempts to help herself the tremor would become more marked. Temperature ranged from 100° F. to 102.8° F. On the 31st she resisted all care, was dull and took food very sparingly. Temperature 103° F., pulse 130, and respiration hurried. On the right thigh, upper middle third, externally, there developed an oedematous area, size of the palm of the hand, reddish in color, and hard and leathery to the touch. General fibrillary twitching of the muscles present in both the upper and lower extremities. On February 2d, she was in a semi-comatose state with pronounced symptoms of catalepsy. There was slight exfoliation of the epidermis of the fingers. Temperature 103.4° F., pulse 160, and respiration 60. Coma deepened and the patient died on the 3d at 1.20 A.M.

AUTOPSY.—*Brain.* Membranes over vertex, in the various fissures and over the cerebellum, were congested and inflamed—the inflammation extending into the ventricles. All blood-vessels were distended with dark semi-fluid blood. About an ounce of clear serous fluid escaped from the skull cavity. There was a small amount of fluid in the lateral ventricles. In the substance of the right cerebral hemisphere, just posterior to the parietal fissure and near the longitudinal, was a small cyst about the size of a pea. The arachnoid and the pia were adherent the one to the other, especially over the convexity. No pus formation and no blood clots.

Heart normal—a post mortem clot in the right ventricle.

Liver fatty and pale.

Spleen soft, dark and friable.

Kidneys: right apparently normal; left, showed a nephritis—capsule adherent and congested, and there was a small cyst in the upper part of the organ.

Uterus normal. Attached to each Fallopian tube was a small cyst containing clear fluid. On the upper third of the rectum was a dark colored object, oblong in shape, 1 1/4 inches long and 1/2 inch wide. This was attached to the rectum on its posterior surface by a small pedicle, and the color of it resembled that of the spleen.

Weight of the organs: Brain, 38 oz.; heart, 8; spleen, 4 1/2; uterus 2 1/2; right kidney, 3 1/2, left 3.

In this case the condition of the blood must have been considerably below the normal standard for upon admission the patient had two felons, one on the thumb and one on the forefinger of the right hand. Two months later she had a boil on the top of her head, and in the early part

of January, about one month before her death, she had an onychia of the left ring finger. And again, just three days before death, there appeared on the thigh an œdematous area which slightly resembled erysipelas. No doubt the onychia was the source of infection, and the blood not being up to the normal condition it failed to thoroughly devitalize the absorbed pathogenic organisms, and the cerebral membranes offered a place of least resistance for the germs to attack.

CASE No. 1328. Female, age 50, servant. Habits good. Diagnosis, acute mania; duration, three weeks. Patient had had one previous attack. After onset of the last attack patient was noisy, violent, incoherent, destructive of clothing, generally filthy in habits, frequently refused food, and had to be fed by the tube. She showed no mental improvement while under treatment and on November 7th, about 45 days after her reception in the hospital, she had a "spasmodic attack" and her body (surface) became cold and all the muscles rigid, pulse weak, and she was unable to swallow. Unless restrained she would roll from the bed. On the 8th, she was steadily failing, body bent to the right and muscles were rigid, and surface of the body was cold. On the 9th, she had tonic and clonic convulsions—body distorted to the right and muscles were rigid. She died at 4 P. M.

AUTOPSY. Rigor mortis well marked. Nothing unusual observed externally, except a fatty tumor to the left of the popliteal space of the left leg.

Spine.—Membranes of the cervical spinal cord were red and congested. Dorsal cord was apparently healthy. Lumbar cord was red and congested. Membranes were adherent to the bony canal in the upper portion of the cervical region, and there the congestion was very marked, and under the membranes was a large effusion of blood, and the cord was apparently softened.

Scalp.—Upon the removal of the scalp it was found to be congested, especially on the left side. The temporal muscle was inflamed, softened and darkened.

Brain.—The dura mater was closely adherent to the calvarium across the longitudinal sinus and over the entire occipital bone, and it was red and congested. It was, also, adherent and congested in the lower portion of the temporal region. The pia was much congested and its vessels were distended. A small white fibrinous deposit was over the middle lobe of the right cerebrum. The pia covering the lower portion of the middle lobe of the left side was very congested, less so on the opposite side, but still the congestion was marked there. Nothing abnormal found at the base of the brain. Dura was adherent to the base of the cerebellum.

In the uterus was a large fibroid. All other organs were normal.

In this case I think that the meningeal inflammation resulted from the condition in which the temporal muscle was found at the autopsy, and that the mode of infection was through the veins and lymphatics. If this opinion be excluded, we must attribute the trouble to a "peculiar condition of the blood," for we have no clue of any other process of infection, unless, forsooth, it can be said that the nasal mucous membrane and the tonsils played the rôle of gateway for the infectious organisms.

The other four cases present little that is interesting and the mode of infection is not traced in any case.

A CASE OF ACUTE MANIA COMPLICATING PULMONARY TUBERCULOSIS, WITH CHART.

BY ROBERT G. WALLACE, M. D.,
Assistant Physician, Binghamton State Hospital.

The frequent association of depraved nutritive conditions with insanity, and the occurrence of organic disease as a causative factor, have long been observed by experienced alienists. Affections of the lungs seem to have a special relation to mental disorders. Of the 8,189 deaths in public institutions for the insane in this State from October 1, 1888, to September 30, 1894, 2,402 were due to disease of the lungs. Of these, 1,659 were cases of tuberculosis, being 20.258 per cent of the total number of deaths. During this same period, however, pulmonary tuberculosis is given as a cause of insanity in only 38 cases. It would seem from this that the disease is seldom well-marked in the early stage of mental disorders and even when present is not always considered an etiological factor. The following is a case of acute mania occurring in a person suffering from pulmonary disease:

J. F., age 21, single, stenographer by occupation, academic education, temperate in habits, has never used liquor, tobacco or opium. Has one sister insane; maternal grandfather was melancholy but never confined in an institution; father and mother are cousins.

Present and first attack began February 8, 1895. For a week pre-

vious to this date he complained of headache and insomnia and spent most of the time in bed under the care of a physician. He was depressed in manner and frequently expressed a fear of some impending trouble. On the night of the 7th, symptoms of exaltation were apparent. He talked a great deal and toward morning was at times delirious. As the disease progressed he became more excitable and maniacal, and developed delusions of a grandiose nature, the principal one being that he was a Greek god. He refused his medicine and did not sleep for several nights previous to his transfer to the hospital. He refused food except in liquid form from the time he became excited.

To the examining physicians he said that he was a god, that he had power over all people, had made the light, and had brought the people up through millions of years of darkness to light. He endeavored to show his strength in many impossible ways, threw off the bedclothing without regard to the presence of women and tried to jump from the window.

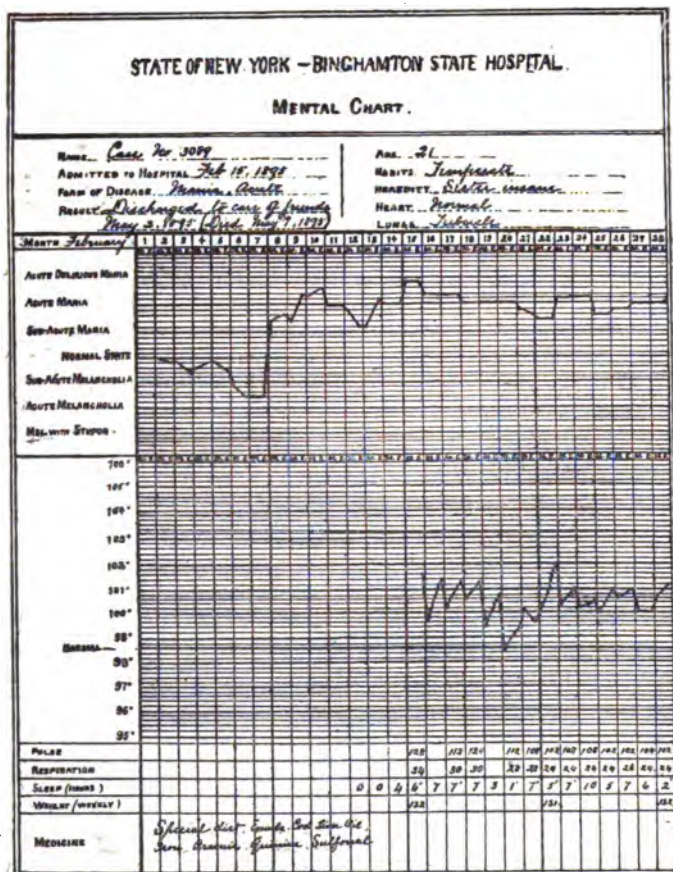
On the night of February 15th, he was admitted to the hospital. He was in a constant state of motor and mental excitement, talked in a rambling, disconnected manner and occasionally sang hymns and songs. When addressing those about him, he used the most profane and obscene language. Previous to this illness he had been a regular church member and an active worker in the Sunday school.

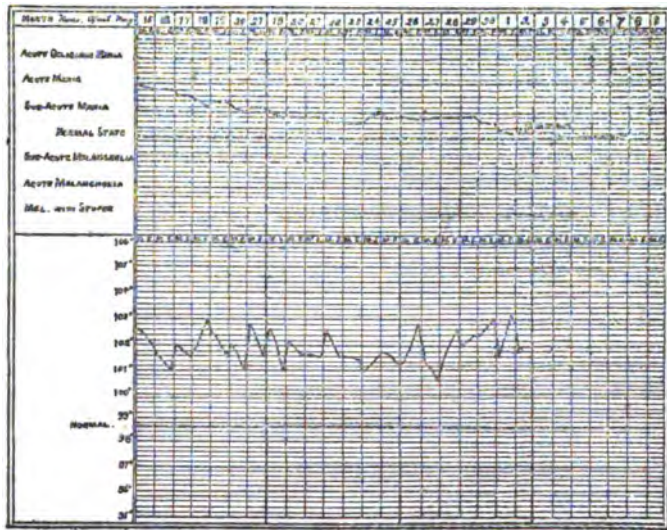
A careful physical examination was made and tuberculous disease of the lungs diagnosed. In the lower left lobe there was an area of consolidation with tubular breathing and mucous râles, and generally over left lung subcrepitant râles. There was an evening elevation of temperature, varying from 100° to 101.5°, respiration ranging from 24 to 28, pulse from 100 to 128. There was a slight cough and expectoration and occasional night sweats. Microscopical examination of the sputa demonstrated the presence of tubercle bacilli. Heart normal. Urine sp. gr. 1026, reaction acid, color dark amber, no sugar, no albumen, phosphates and urates in excess. The lung symptoms had not been recognized by his friends or attending physician.

During the two weeks following admission, he continued excited and talkative. A noticeable feature of the case was the extreme dislike which he expressed at times for those attending him. As his disease progressed he suffered from diarrhoea, and occasionally soiled his bed. Whenever this occurred he became much excited, and notwithstanding the kindest care and attention on the part of his nurses, he believed that they bathed him or changed his linen simply as a matter of annoyance. Gradually the physical symptoms increased in severity. By March 10, the right lung had become involved and emaciation was marked. Mentally, he was quieter in manner but continued to entertain the delusion that he was a Greek god and at times he would sing in a loud voice. He was profane in conversation and rambled from one subject to another. By April 2d, he had improved suffi-

ciently to converse with his friends and seemed to more fully appreciate his condition. At no time, however, did he realize that he was seriously ill. His dislike for some of his nurses continued and he frequently accused them of abuse, or of stealing his clothing, when such was clearly not the case. Physical signs of tubercle were now well marked over both lungs. Temperature usually highest during the morning hours and varying from 101° to 103.5°. Early in May he had improved so far mentally that he could be cared for at home and at the request of his friends he was discharged to their care. After his return home he failed gradually and died May 7, 1895, just three months after the mental symptoms were first noticed.

This case is of interest from the point of view of the etiology and the history. So far as known the patient had been a person of exemplary habits, with no excesses to which the resulting mental symptoms could be attributed and in whom the acute mania seemed to be a direct sequel of the lung affection. Predisposed as he was to mental trouble, it only required the presence of an organic disease to set up the symptoms of a deranged mind. The course of his disease was rapid. At the time when in an ordinary case we would expect to see an improvement in the mental symptoms, his strength had been so far exhausted by the two diseases that a restoration to health was impossible. It has been held by some authorities, and with good reason, that inflammatory conditions supervening on an attack of mania will give a marked improvement in the symptoms. Cellulitis, fractures and operative procedures we know have this effect and may even result in a prompt and permanent recovery. Tubercular disease has rarely however given any but deleterious results. Whether occurring in a case of insanity during the early months, or years after the patient has been admitted to a hospital, the prognosis is unfavorable and never do we observe the beneficial results so often seen after an acute inflammation.





A CEREBRAL TUMOR.

By S. F. Mellen, M. D.,
Assistant Physician, Willard State Hospital.

A. D. was transferred to the Willard State Hospital from the Hudson River State Hospital on January 7th, 1896. She was admitted to the Hudson River State Hospital June 12th, 1895, from the Albany Almshouse, of which she had been an inmate for the previous three years. Six days prior to her admission to the Hudson River State Hospital, she became disturbed and manifested delusions of persecution. She declared that her legs had been amputated by her persecutors. She talked incessantly and showed much mental confusion and her memory was poor. She was violent and destructive and at times refused to eat. The following notes are taken from her history while at

the Hudson River State Hospital: June 13, 1895. Internal strabismus is a noticeable symptom in her case as was giddiness some days ago. July 29th, 1895. Exaggerated left internal strabismus is of only one to two years' standing, has much dizziness and severe pain in the occiput. October and November, 1895. Pain, giddiness, Romberg's symptom, singultus, and inco-ordination are suggestive of lesion (tumor) of the cerebellum.

On her admission to Willard State Hospital, her age was noted as sixty-six years. An examination of her heart showed a musical murmur, indicating disease of the mitral and aortic valves of the heart. Internal and upper strabismus of the left eye was also marked. During her residence at this hospital, she was in a condition of acute melancholia. She gradually failed in her physical health. Occasionally she was irritable and quarrelsome, and would accuse other patients of annoying her by calling her "an old Irish woman." She also said her husband had been killed and his legs cut off in a railroad accident. She often expressed a feeling of "being so stupid." She frequently complained of a headache, which was apparently in the left temporal region as indicated by her gestures. She was given antipyrine gr. 5 t. i. d. for one week, from January 29th, to relieve the headache. She became more dull and insensible, and complained less of the headache.

Her health continued to fail, and she was placed on a tonic treatment. In the night of February 17th, she was found struggling with another patient, and shortly after being quieted and put to bed she had a convulsion lasting about five minutes. She fell out of the bed and sustained a slight cut on the nose. On February 24th, she had another slight convulsion in the morning. On this day erysipelas developed in the injured place on her nose. Three days after, the inflammation began to subside, but on February 29th, it became rekindled and spread to the opposite and right side of the face. During her illness she was conscious, but dull in mind, and slow of speech. Early in the morning of March 1st she was apparently in a sound



Showing tumor in situ.



Showing tumor removed.

MELLEN: A CEREBRAL TUMOR.

slumber, but could not be aroused. On examination her pulse was found to be rapid and feeble. Her respirations were frequent but easy. Her temperature was 105° . She was unconscious and unable to swallow any fluid. In an hour and a half she was dead.

At the autopsy the disease of the heart was found to have been sufficient to have caused her death. On removing the brain a tumor was discovered beneath it. The tumor was sarcomatous in appearance. It was attached to the dura mater for two inches on the posterior border of the lesser wing of the sphenoid bone, and had penetrated to the bone which was eroded and roughened. It was also attached to the anterior clinoid process.

The tumor weighed one and one-fourth ounces. It was two inches long, one and three-fourth inches wide, and one inch thick. There was no adhesion between it and the brain. The brain rested upon it, so that the lateral half of the left side of the pons Varolii was somewhat flattened. The uncinate and inferior temporo-sphenoidal convolutions were almost obliterated by the pressure of the tumor. The third nerve was involved in the growth through which it passed. The nerve apparently, however, was uninjured. The sixth nerve was pressed upon by the tumor, and almost destroyed. The inner edge of the tumor pressed slightly upon the optic commissure.

Photographs were taken of the brain while in a frozen condition, so that the relations of its parts are not accurate.

The accompanying illustrations represent the brain without the tumor and also the brain with the tumor placed as nearly as possible in the position which it held during life.

The symptoms in this case were not sufficient to afford an absolute diagnosis of cerebral tumor during life. The lesson to be learned from this case is to pay closer attention to a persistent headache complained of by an insane person.

NOTE.—A microscopical examination of a section of this tumor made by Dr. Wm. Steinach, medical interne, shows that it consists of round and spindle cells and an abundance of fibrous tissue and is a fibro-sarcoma.

TRAUMA AND SUN-STROKE AS CAUSES OF INSANITY.

By HENRY P. FROST, M. D.,
First Assistant Physician, Willard State Hospital.

Under this head it is not my purpose to attempt a complete treatise on traumatic insanity, but merely to record several illustrative cases, and submit a review of those admitted to this hospital during a period of five years. Cases due to sun-stroke are similarly analyzed, in order to ascertain the points wherein they differ from those caused by actual violence, their close resemblance, in some particulars, having been frequently noted.

In a paper of this kind a review of the literature is out of place, and it will suffice if I refer to Mickle's article on this subject in Tuke's Dictionary of Psychological Medicine, which is, I think, the best obtainable. Most authors devote only a few paragraphs to these factors, probably because the proportion of insanity caused by them is really quite insignificant. Injury of the brain, however, is, of all the causes which lead to insanity, the most palpable, and the one whose *modus operandi* is most readily appreciated. For this reason, if for no other, the cases which can be thus accounted for are of especial interest.

They have, however, a much stronger claim upon our attention from the fact that it is practically in this field alone that we can hope to accomplish any good by surgical interference. That comparatively few, even in this category, are relieved by operation is very true, but that should be only an additional reason for subjecting this whole group to a close analysis, in the hope that we may the more readily distinguish the few hopeful cases.

The comparative infrequency of traumatism as a factor in the causation of mental diseases is evident in a glance at any "table of causes" and scarcely needs to be emphasized, but as an illustration of close correspondence in statistical results, the following figures are interesting. Of 2,297

patients admitted to this hospital, 45 or 1.95 per cent are noted as insane from injury to head. Of 16,208 admitted to all of the New York State Hospitals, 279 or 1.72 per cent; of 12,245 admitted to the asylums of New York City and Brooklyn, during the same period, 224 or 1.82 per cent; and of 32,000 admissions to other hospitals in the United States, 600 or 1.87 per cent are placed under this head. The reports of the Lunacy Commissioners for England and Wales from 1879 to 1884 show 82,051 admissions, of which 2,562 or 3.1 per cent were due to "accident or injury;" but this term might include injuries other than those to the head, and it is stated that cases were included in which the accident was only a predisposing cause,—hence the larger percentage noted.

Insanity resulting from traumatism may assume any one of a variety of types, depending upon the nature of the injury, the age, the habits or the temperament of the patient, and while a few cases will be found to present the symptoms which have been described as characteristic of "traumatic insanity," they are so rare as to be the exception rather than the rule; and furthermore the same symptoms are sometimes observed in patients who are insane from other causes, e.g., intemperance, so that the necessity for recognizing a distinct form of insanity as "traumatic" is questionable. It is a well known fact that persons who have received a brain injury are prone to alcoholic indulgence and that they are peculiarly susceptible to alcohol, hence it naturally follows that in a certain number of cases, the resulting insanity assumes a form indicative of its dual origin. Previous intemperate habits and an inherited neurotic tendency are very generally stated to increase the liability to serious mental derangement from injuries to the head, but, in our experience, neither of these predispositions is noted in a larger proportion than is found in any group of miscellaneous insanities comprising an equal number of cases.

The following observations upon insanity following injury are based upon 37 cases, 29 men, and 8 women,

admitted to this hospital during the five years from October 1st, 1890 to October 1st, 1895. The total number of admissions for that period was 2,152. Percentage of traumatic cases 1.82 per cent.

Character of injury.—Of the 29 males, 10 had depressed fractures. One was injured by an explosion of dynamite, and the others were hurt by falls or blows on the head. None of the females had fractures.

Occurrence of epilepsy.—10 males had epilepsy following the injury, and of these 4 were among the cases noted as having fractures. With the exception of one man, convulsions began soon after the accident.

Form of insanity.—Men—acute mania, 2; chronic mania, 4; acute melancholia, 1; chronic melancholia, 2; chronic delusional insanity, 2; dementia, 8; dementia, epileptic, 7; mania, epileptic, 2; imbecility, 1. Women—chronic mania, 2; chronic melancholia, 2; dementia, 3; dementia, epileptic, 1;

Intemperance.—Seventeen men were temperate and seventeen intemperate prior to injury, and in five cases information on this point was not obtained. None of the women was intemperate, and none of either sex was addicted to the use of any drug.

Four men who had formerly been temperate became addicted to liquor after being injured. Two of these were soldiers with depressed fractures due to shell wounds, one a youth who received a severe blow upon the head at the age of sixteen, and the fourth an elderly farmer who was injured by a runaway horse. One of the old soldiers mentioned above had epilepsy, and of the seven who were intemperate before being injured, five subsequently became epileptic.

Heredity.—Only six of the men were known to have insane relatives, and in but one case was the inheritance direct. In this instance the patient's father and two brothers were insane, and he was one of those who were intemperate prior to the injury—a severe blow upon the head. The mother and brother of one of the female cases had been insane.

Suicidal tendency.—This was noted in seven men and two women.

Violent and dangerous tendencies.—Eighteen men and two women manifested dangerous tendencies, due to delusions or irritability.

Recovery.—Of the thirty-eight cases, but one recovered, and that was an intemperate man who had an attack of acute mania caused by tumbling down stairs when intoxicated, striking his head a severe blow, but not fracturing the skull.

The following cases now or recently in the hospital, illustrate some of the special features which have been insisted upon in connection with insanities of the class under consideration:

CASE I.—P. M., male, age 51, nativity Ireland, laborer, intemperate. Admitted January 30, 1895, with the following history: Came to the almshouse more than a year ago, and has been there most of the time since, only going out to work for short periods. Two months before being transferred to the hospital he became confused, showed loss of memory, and was excited and boisterous. This condition became aggravated later, and he was committed as insane. On admission here he was depressed, dull and slow in movements and speech, and not clear mentally, though able to give some account of himself. He said that two months before, while at work, he became dazed, and for a while was unable to recognize persons whom he knew perfectly well and that he had since suffered severely with headache; also that he had formerly been intemperate, but for some years past had not used liquor to excess. He lost his wife and children sixteen years ago, since which time he has worked in many places, changing his residence frequently, and apparently without any definite object. Ten or twelve years ago a heavy iron rod fell from a height and struck him on the head, causing a punctured fracture of the skull through the left parietal boss. The wound was slow in healing, and, he says, discharged "seven pieces of bone," but after that it never gave him any trouble. There was no paralysis at the time, and until recently, no headache, and the pain in his head complained of now is not referred to that region but is general. Physical examination revealed no signs of local injury to the brain, but there are indications of serious organic changes of a diffuse character. His speech is thick and tremulous, and the facial muscles and tongue unsteady. Reflexes normal. No paresis of either side and no anæsthesia or hyperæsthesia, but evidently some disturbance of the

sensory functions leading him to imagine that his bed is "bewitched or filled with electricity." He is excitable and has delusions which cause him to make frequent threats and attempts to assault me. He declares that he hears me outside of his door at night, discussing plans to injure him, and that I burn morphine in the ward and force the fumes into his room. Five months after admission he had an epileptic convulsion, and in the succeeding six months two more, followed by confusion, amnesia and automatic movements. We cannot ascertain that he ever had convulsions before, and he says himself that he never did.

In this case an operation would be done could consent be obtained, though it is extremely unlikely that any improvement would result, the symptoms indicating general rather than local disease of the brain, probably dependent as much upon intemperate habits as upon the injury itself.

CASE 2.—G. S. M., male, age 21, divinity student, temperate habits, no insane relatives. The patient was a bright, studious young man, and mentally well balanced until three years ago, at which time he was kicked upon the head by a horse and quite seriously hurt. The physician who attended him discovered that the skull was fractured, but did not think there were any indications for trephining, so he merely dressed the wound which soon healed. Following the injury the patient frequently complained of severe headache, and seemed incapable of applying himself as formerly. Fifteen months later he commenced to have epileptic convulsions, the seizures being frequent and severe. He was then taken to a hospital in Rochester where an operation was done. He had two convulsions a week after the operation, but has had no more up to this time, though he has frequently complained of a sensation of numbness in the right side of head and face, and has had momentary lapses of consciousness and fleeting impulses of various sorts, also headaches, with congested face, full rapid pulse and suffused eyes. When admitted here he had been disturbed for several weeks, the attack having been precipitated by an altercation with a woman who accused him of opening her letters. He became nervous, did not sleep, smoked cigarettes (which he never did before), was irritable and finally quite violent. Made threats against members of the family and secreted knives and razors for use as weapons. He thought he was in danger of being killed, and denied any relationship with his father. Examination revealed, at the site of the injury and operation, just above the temporal ridge, two inches behind the orbital margin, on left side, an oval depression one inch wide and one and one-half inches long, the long axis directed from before backward. Pressure or percussion over this spot was not painful, but there was some tenderness at a corresponding spot on the opposite side, whence, he said, seemed to originate all of the head-

aches which he had experienced. He was nervous and appeared startled. Tongue and hands tremulous, reflexes normal; no paralysis of any part. He expressed the delusion that Catholic spies were watching him. Was irritable and not inclined to talk freely.

For several weeks after admission he was irritable and quarrelsome, took delight in annoying other patients, and made many childish complaints, after which he commenced to improve, and now, after four months, he is quiet in behavior and usually quite rational, though still easily excited. When angered he is very profane,—much to his own surprise, as he says after the fit of passion is over. His explanation is that he feels an irresistible impulse to use bad language, although he never did so before this attack commenced. He has been free from headaches since admission, with the exception of one day, when he seemed to suffer greatly and was compelled to lie abed. At that time he was restless and confused, but did not have a convulsion nor an attack of petit mal. Inasmuch as the injury in this case received prompt and appropriate treatment, and there is now no evidence of anything more than a functional disturbance, the prospects for recovery are fair.

CASE 3.—J. T., male, age 55, carpenter, uncle and two nephews insane. History as follows: He received a shell wound of the head during the war, as evidence of which he now has a depression the size of a silver dollar in the upper and posterior part of the parietal region on the left side. Since then he has been simple and childish, and incapable of doing any work or of protecting his property interests. Although formerly very temperate, he has at times since the injury manifested a strong craving for liquor, and has indulged to excess; also uses tobacco in excessive amount. For the past two years he has had constant pain in his head, has been very nervous and seemed to be apprehensive of evil, without knowing what he feared. Could not decide the simplest question for himself, but must appeal to his brother for everything. Several months ago he had an attack of influenza, and following that his symptoms grew worse. He has been excited, and says that he is subject to homicidal and suicidal impulses. He made a weak attempt to cut his throat. When admitted here he was depressed and emotional; declared that he would be compelled to commit some dreadful act unless he should be placed in a cell and securely handcuffed; said he was "as gentle as a lamb," but he feared that if not restrained he would yield to the horrible impulses which had taken possession of him. He complained of pain in the head, describing it as a "crushing" sensation at the vertex; exhibited coarse tremor of the hands and facial muscles. He remained in the hospital six months, during which time he improved in physical condition and recovered from the intense depression which had occasioned his commitment, returning, in fact, to the condition of mild dementia

and hypochondria which had existed previously for twenty-five years. He continued to complain of headache and various other ills, many of them imaginary—made almost daily the childish request that he be not transferred to the “bad ward up stairs, where they will kill me” and was always “just about to have a bad spell,” which he never had.

CASE 4.—H. F., male, age 42, laborer, temperate habits, brother imbecile, previous history not known. One year before admission here he was kicked by a horse and his skull fractured. Since the accident he has been demented and incapable of taking care of himself. Would lie about on the benches at the alms house, where he was confined, and if interfered with was irritable and violent. On admission here he was confused and dull, talked to imaginary persons and had hallucinations of hearing; was morose and made threats if annoyed; totally blind (blindness not connected with injury); physical condition feeble. He died of pneumonia two months after admission. Extract from autopsy record: “The dura was strongly adherent to the bone everywhere and to the pia at vertex. In left frontal region there was a depression one-half inch deep over an area of one inch by one and one-half inches. The bone, the membranes and the cortex were all adherent here, and there were evidences of chronic inflammation for a considerable distance all around this point. Elsewhere the brain was normal in appearance. The interest in this case centers in the autopsy report. He could not have been subjected to an operation.

CASE 5.—F. E. B., male, age 32, printer, intemperate, no insane relatives. He fell on the ice at the age of 16, striking the head a severe blow. Since then he has been eccentric and weak-minded, and his peculiarities have recently become more marked. He has a frightful temper, and the slightest cause will bring on an attack of ungovernable fury, during which he has no regard for life or property. When at his best he is affable and pleasant, converses with fair intelligence, and, were it not for a constant manifestation of unbounded conceit and arrogance, he would pass for a sane man. Engaged in any controversy, however, or even in an amicable talk somewhat prolonged, he becomes confused and finally excited. He acquired considerable skill at his trade, but his work was constantly interrupted by debauches, and he could never retain a position very long. He was committed to the hospital on account of dangerous violence exhibited in the family circle. On admission was very moody and irritable and not inclined to talk freely but later expressed the delusion that a great many people whom he met every day exerted a peculiar influence over his mind by the exercise of some mysterious force; they impelled him to commit acts which were disgusting to him, and they put evil thoughts into his head. His stay here, which is likely to be indefinite in duration, has been punctuated with outbursts of violence, sometimes entirely unprovoked. He has causelessly assaulted

patients, attendants and doctors, though at other times he is effusively friendly with all.

CASE 6.—S. M., male, age 60, no occupation, habits very intemperate, mother and son insane. History states that he was thrown from a horse at the age of eighteen and received a severe blow upon the head, causing concussion of the brain. From this injury dates a marked change in his character and habits. Soon after its occurrence he began to drink to excess, and from that time until now, more than forty years, he has been grossly intemperate; so much so, that he was long ago declared incapable of managing his estate, and was allowed a mere pittance for his support. It is stated that two or three drinks will make him wild, and when in this condition he always creates a disturbance on the street, for which he is arrested and usually committed to jail. It is computed by those who are well acquainted with him, that he has spent at least twenty-five years of his life in jails and penitentiaries on account of his intemperate habits. When admitted he had just gotten over one of these attacks and presented no active symptoms, appearing merely weak-minded. He seems to be absolutely without any moral sense, and will talk quite boastfully of his numerous arrests. Has no affection for wife and children and no regard for the proprieties of life.

Positive conclusions are not to be expected from the study of so small an array of facts, but from what has been here set forth and from observations made upon a number of other patients admitted prior to 1890, who could not be included in my summary owing to indefinite histories, I think the following statements are warranted.

1. A marked hereditary tendency to insanity is found in but a small proportion of traumatic cases, though doubtless when present the resulting insanity is thereby aggravated, and probably a lesser degree of injury will suffice to cause it. This is easily explainable when we consider that all are alike exposed to accidents.

2. For a similar reason, though not to the same extent, (since habits of dissipation expose a man to accidents) intemperance does not appear with especial frequency in the previous history of these cases. Epilepsy seems to follow brain injury in a large proportion of intemperate cases.

3. The tendency to alcoholic indulgence and other irregular behavior after such injuries is verified and illustrated.

4. Dementia is the prominent feature of insanity due to injury of the frontal lobes, and in these cases epilepsy is comparatively rare.

Sun-stroke as the determining cause was found in exactly the same number of cases (37) among the admissions for the corresponding period, but in this list there is a larger disproportion between the sexes, there being thirty-five men and only two women.

Subjecting these to the same analysis as the cases of injury, the following facts come to light.

Epilepsy resulted in four cases, all men of temperate habits, of whom one only had an insane relative. In this case a brother was insane.

Intemperance was a feature in the histories of four of the cases, all males.

Heredity.—Nine men and one woman had insane relatives but in only four cases was the inheritance direct. In three of these a brother or sister was affected, in addition to father or mother. There was no instance of intemperate habits among those showing heredity.

Form of insanity.—Males—acute mania, 3; chronic mania, 3; recurrent mania, 1; dementia, 13; dementia epileptic, 2; acute melancholia, 10; chronic melancholia, 1; general paresis, 1; idiocy, 1, (sun-stroke at the age of eighteen months). Females—chronic mania, 1; dementia, 1.

Suicidal tendencies were present in seven of the male cases. Violence was exhibited by eleven of the men and both of the women.

Recovery.—Six men recovered; five were cases of acute melancholia and one acute mania.

I did not find any cases presenting special features worthy of report, from which it would appear that there is no special relation in type between the insanities due to trauma and those following sun-stroke.

PHTHISIS AMONG THE INSANE.

BY GEORGE ALLEN, A. M., M. D.,

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The opinion generally prevails that the insane contribute a relatively larger number of deaths from consumption than is furnished by the sane population of any country or community. Writers on insanity, as a rule, agree with this view, basing their opinion upon published asylum statistics. Clouston, of Edinburgh, admits the truth of this proposition after a series of observations extending over a number of years. He believes, however, that the condition of things is improving, and that in modern asylums, with improved methods of care and better sanitation, the death rate from consumption has been considerably reduced. In evidence he cites the statistics of "Morningside" where, from 1842 to 1863, 29 per cent of all deaths were due to phthisis; while, during the years from 1879 to 1888, at the same hospital, the percentage of deaths from phthisis was only 13.6.*

Statistics in the past have shown that from 25 to 30 per cent of all deaths in asylums have been due to phthisis. Other pulmonary affections cause a large mortality in institutions for the insane. A medical superintendent of a New York State hospital reports for the year 1895 that pulmonary affections are chargeable with 47 per cent of all deaths for that year. As most pulmonary affections come under the head of preventable diseases, the suggestions in this paper, though referring chiefly to phthisis, are equally pertinent to pulmonary affections in general.

The State hospital system of New York State, as shown by the reports of the Lunacy Commission from 1888 to 1895 inclusive, has had a mortality from phthisis of 14.7 per cent of all the deaths occurring in these institutions. These figures show progress in the right direction.

*It would be interesting to know the results obtained by Dr. Clouston at Craig House, the new portion of "Morningside," recently completed and provided with the most approved modern appliances.

Dr. J. W. Babcock* in a recent paper gives a table showing that in ninety-eight American asylums the mortality from phthisis varied from no deaths at all in three asylums to 60 per cent in one; while 67 of the number had a mortality from consumption varying from 10 to 35 per cent. The writer does not state whether the calculations extended over a number of years, or merely represented the results of a single year. Probably the latter. For no hospital would be likely to escape deaths from phthisis altogether as the table would indicate, nor would any institution be likely to have 60 per cent of deaths from phthisis, for any number of years in succession.

Dr. Babcock† concludes that "tuberculosis is two or three times as common in institutions as in the general population;" that "the prevalence of the disease may be regarded as a test of the sanitary condition of the hospital;" that "improved sanitation has reduced the death rate, but has not exterminated the disease;" that "some small, well conducted asylums, are free from it;" that "in private houses the insane are not more liable to phthisis than are other people." The last conclusion agrees with Bucknill's statement: "The insane in private dwellings are not more liable to phthisis than is the general population."

If these conclusions are correct, and if it is true that phthisis is caused by the tubercle bacillus, then it would seem that correct prophylactic management and careful sanitation ought greatly to limit the disease, if not banish it entirely from hospitals for the insane. The duty, therefore, becomes imperative, and State hospital physicians cannot fail to be keenly alive to the necessity of using every known means of reducing this disease to the minimum.

As the object of the BULLETIN is to chronicle State hospital experiences, it is now my purpose to speak of the work that has been done along these lines at the Middletown

*Transactions of American Medico-Psychological Association, Vol. I, 1894, p. 182.

†Op. cit., pp. 185 and 186.

State Homeopathic Hospital, and of the results which have been attained. The work has not by any means been perfect, but inasmuch as the results have been in some measure gratifying, it may not be amiss to speak of the conditions which prevail, and of the methods in vogue at this hospital. After which each one may judge for himself of the influence which the means used may have had in bringing about the recorded results.

The small number of cases of consumption, and the relatively small number of deaths from this disease among the patients of the Middletown State Homeopathic Hospital, has often been remarked by the members of the medical staff. With a view of satisfying myself as to the exact facts, I have taken pains to go carefully over the records of the hospital from its opening to the beginning of the present fiscal year. In the results recorded, I have included all deaths that could in any way be said to have been due to phthisis. In making these investigations, cases of alleged death from exhaustion have been carefully scrutinized, and post mortem records have also been examined.

As a result of this examination it appears that during the period from April, 1874, to September 30th, 1895, there were treated at this hospital 4,524 cases of insanity, with 651 deaths, from among which number only 27 deaths can be attributed to phthisis. That is, of the whole number of deaths only 4.1 per cent were due to phthisis. During *nine* of the *twenty-one years* of the hospital's history, no deaths whatever occurred from phthisis. So that for the whole period the average number of deaths from consumption has been less than one and one-third persons each year. The largest number of deaths from consumption in any one year occurred in 1894, when there were seven deaths from this cause. Of this number four came to the hospital with the disease well advanced. During this year it was discovered that some of the cows composing the hospital dairy were tuberculous, and after careful tests over thirty of the herd were killed. Possibly the free use

of milk from tuberculous cows may have been the cause of three of the cases occurring in 1894; but this is rather problematical, as the appearance and history of the patients would lead one to suppose that the seeds of disease had been implanted in these patients before their admission. The following year, 1895, only three deaths were due to phthisis, although the number of patients treated was larger than the previous year.

In order to convey a correct understanding of the figures, the following standards of comparison are given:

The census of 1890 shows that in each one thousand deaths there were in the United States 116 deaths from consumption; in New York State there were 120 deaths from consumption to each one thousand deaths. Reviewing the sanitary districts of New York State as arranged by the State Board of Health, it appears that the lowest death rate in the State is found in the Southern Tier district. In this district are included the seven Southern border counties of the State lying west of Sullivan county. The mortality from consumption in the Southern Tier district in 1890 was 89 in each one thousand deaths from all causes. In the Hudson River sanitary district (that in which this hospital is situated), the mortality from consumption was 121.92 to each one thousand deaths. In the city of Middletown, where the hospital is located, consumption caused, in 1890, 102 in each one thousand deaths. The hospital's record for the same year showed a mortality rate from consumption of 33 to each one thousand deaths. This is a trifle under the rate for the entire period of the hospital's history, which, as stated, was 4.1 per cent, or 41 deaths from consumption in each one thousand deaths from all causes.

The following is a tabulated résumé of the foregoing figures:

1890. In each of one thousand deaths there were in the:	1890. Deaths from Consumption.
United States.....	116
New York State.....	120
Southern Tier Sanitary District.....	89
(District having lowest death rate from consumption in New York State.)	
Hudson River Sanitary District.....	121.92
(District in which hospital is situated.)	
City of Middletown (where hospital is situated).....	102
Middletown State Homeopathic Hospital.....	33.3
1874 to 1895 inclusive.	
Middletown State Homeopathic Hospital.....	41

The Middletown State Homeopathic Hospital is situated in the city of Middletown, Orange county, N. Y. It is in the Hudson River Sanitary District of the New York State Board of Health. This hospital has received patients from fifty-four of the sixty counties of the State. Large numbers have come from New York city, and the counties composing the Maritime district, which furnishes the largest death rate from phthisis of any district in the State. The hospital now has a population of 1,150 patients, and has reached its present numbers by gradual growth since the opening of the institution. Both public and private patients have been received, 2,628 of the former, and 1,896* of the latter class. Our patients have been received from almshouses, and from the homes of the poor, as well as from the homes of the well-to-do, and even the opulent, though the numbers of the latter have been relatively very small. The majority of our private patients have been from the substantial classes who have been able to pay very moderate rates for the maintenance of their friends under the visitation of insanity. The social condition of our patients can scarcely be considered as influencing the mortality from phthisis, for consumption, as is well known, visits alike the homes of the rich as well as the abodes of poverty.

As to situation, the hospital is built on a moderate elevation, the ground, sloping gradually on three sides, toward

* September 30, 1895.

running streams. The soil is very stony, but porous, permitting of good drainage. Being situated on high ground, there is usually a considerable breeze, which greatly aids in securing good ventilation of the entire institution. Great pains are taken to admit to the wards an abundance of fresh air at all times. The buildings vary from two to four stories in height, and are of brick. The basements are light and dry, with stone or cement floors, and are kept as free as possible from rubbish and dirt of all kinds. The buildings are heated by steam, mainly by the indirect method. Air entering from without, and passing over steam coils in the basement, is conducted thence to the rooms and wards. It has been the custom, from time to time, whenever epidemic colds and influenzas have been prevalent in the community, or seemed likely to become so in the hospital, to have the basements thoroughly sprinkled with some antiseptic solution. This practice has appeared to have a beneficial effect in checking epidemic influences about the institution. It has also been the custom to have the floors of the wards mopped frequently with suds made from hot water and carbolic soap. The water being used hot, the floors quickly dry, and with the mop accumulations of dust, dried sputum, and everything of an infectious nature is removed from the floors and thrown into the sewers. This is preferable to stirring up the dust with brooms, and forcing it into the air to be inhaled by the patients. While mops are unsightly, and from an æsthetic point of view may be objectionable, if properly cared for and properly used they are of great assistance in keeping the floors of a hospital in a cleanly and sanitary condition. Dust, as is well known, is one of the readiest means of conveying contagious germs, and mops when used in connection with disinfectant solutions will do much to remove dangerous dust from the floors of hospitals in a safe manner.

In regard to diet it has been the custom, along with a carefully selected and liberal diet, to allow the patients the use of milk almost *ad libitum*. Great use has been made of hot milk, preference being given to this method of ad-

ministering it. This method of administering milk was adopted long before it was known that the tubercle bacillus was the cause of phthisis, and that heat rendered sterile solutions containing these germs. Now it appears that by heating milk in the past, we have practically sterilized it, and thus may have saved our patients from the dangers of tuberculous infection. The hospital now consumes 1,400 quarts of milk daily, and probably at no time in many years has the per capita allowance of milk been less than at the present time.

Another distinctive feature of care at this hospital has been the treatment of large numbers of patients by rest in bed. This treatment begun here in 1880 has gradually been extended as its benefits have become more apparent, until to-day, with a population of 1,150 patients, about 450 are constantly in bed. The latter number include weak patients, excited patients, demented patients, and those disposed to injure themselves or others—those patients who, if not thus cared for, would be most subject to exposures likely to induce colds, bronchitis, pneumonia, and, in those predisposed to it, phthisis as well. We believe this treatment has a tendency to diminish bronchial and pulmonary affections. (Less than a dozen deaths from pneumonia and bronchitis have occurred at this hospital during its entire history). Patients in our hospital or infirmary wards are much more rarely affected with colds than are those in other portions of the institution. When the "grip" appeared in this country, and was so universally prevalent in 1889 and 1890, it was observed that patients who were constantly in bed in our hospital or infirmary wards, though including large numbers of old and feeble persons, were almost entirely free from this disease, while many of our patients and employees in other wards contracted the disease.

Dr. Clouston* in a recent address before the Royal Society of Edinburgh, speaking of the effect of influenza upon the higher nerve centres, says: "No mental and no

* British Medical Journal, January 18, 1896, p. 131.

nervous effort is possible while the disease lasts, with most people; and the simplest but most effectual mode of conserving and restoring nerve energy, by going to bed and staying there a long time, is never so necessary as in influenza." The experiences of this hospital have clearly demonstrated the additional and more important fact, that our insane patients "by going to bed and staying there a long time" escaped attacks of influenza altogether.

The ventilation of the hospital or infirmary wards is necessarily of the most thorough kind. Oftentimes strong currents of air* blow through these rooms from open windows, and yet it is a rare thing for patients in bed here to contract colds. The personal sanitation of these patients is also most excellent. Daily bathing and massage tends to keep the skin and muscular system in good condition, while the diet tends to put fat on the patient, and bring him into the best possible condition to withstand any predisposing tendency which may exist to phthisis. The friends of some of our patients have been fearful that just the opposite condition might ensue, and that confinement in bed might induce a decline, and render active a latent predisposition to phthisis. An examination of the hospital's death rate from phthisis, and the institution of comparisons, has served quickly to dispel such fears.

I think there can be no doubt that continued rest in bed, for the insane, prolongs life, and reduces the tendency to phthisis, which has been believed to be the common heritage of the chronic insane. Rest and bed treatment for the insane is in harmony with the methods which Hilton† has recommended in such a variety of conditions, and which Dr. S. Weir Mitchell has systematized and applied to the treatment of other neuroses.

The number of patients at work at the Middletown State

* Dr. Byrom Bramwell, of the Royal Infirmary, Edinburgh, (*Studies in Clinical Medicine*, 1890, Div. II, p. 227 says), : "There is nothing more conducive to good health than plenty of fresh air during the night as well as the day. Both for preservation of health and for the treatment of disease, it is difficult, I think, to overestimate the importance of sleeping in large, airy, well ventilated bedrooms."

† Rest and Pain. Hilton, 1876.

Homeopathic Hospital is relatively small, only about 25 per cent being employed, while at some of the other State hospitals a larger number is reported, and in one institution over 78 per cent of patients is reported as employed in some useful occupation. At this hospital employment has been prescribed as a remedial agent, rather than as an end to be sought from industrial or other reasons. The industrial idea has been subordinated to the hospital idea, and protection and curative care, rather than work with the exposure incident thereto, has been the guiding rule. To such measures is due, I believe, to a large extent, the hospital's small number of deaths from preventable diseases.

When a case of phthisis occurs in the hospital, it is the practice to isolate the patient as far as practicable, and by disinfecting the sputum, and by general antisepsis to limit as much as may be the transmission of the contagion to others. Phthisical patients are kept in rooms by themselves, and after their removal, by death or otherwise, the floors and walls are thoroughly cleansed with antiseptic solutions, before permitting another patient to occupy the apartment. The hospital laundry is now provided with a sterilizer, in which infected clothing and bedding can be treated with "live steam" until it is rendered entirely aseptic.

Another feature which may be important with reference to the prevention of phthisis and other contagious and infectious diseases, is the frequent painting of the rooms and wards throughout the entire hospital. The side walls and ceilings of all the rooms throughout the institution have been frequently (every few years) treated to fresh coats of paint. This not only covers up and prevents the escape into the air of any disease-producing germs which may have secured lodgment on the walls, but makes it possible to wash the walls, a feature of great value in promoting a cleanly and sanitary condition. These methods, combining as they do, cleanliness of person and apartments, and thorough ventilation of all buildings, will do much to keep a hospital in a sanitary condition, and to a great degree

free from contagious principles. This certainly should be the aim in all hospitals, and if Bucknill's statement be true that the insane in private dwellings are as free from phthisis as is the general public, then assuredly, with all modern knowledge on the subject of germ transmission of disease, and methods of prevention; and with buildings constructed on the most approved plans, and with the best sanitary appliances, State hospitals ought at least to be able to show as favorable a death rate from phthisis as the community in which the hospital is situated, or from which it draws its patients, and even better results are not impossible. In order to do this, however, it will be necessary to protect our patients, in the most careful manner. The most modern methods of sanitation, good diet, isolation of infected cases and antiseptics, should be supplemented by the same kind care, good nursing and protection that we accord to the sick from other diseases. Rest in bed during treatment should be the rule when the patient is in the active stage of his malady, as well as during the helpless stages of mental and physical weaknesses into which so many fall.

The greatest care should be exercised in prescribing employment for the insane. Employment should always be considered in the light of a therapeutic agent, of use in certain cases, but, like all other therapeutic means, to be prescribed with intelligence and caution. The theory that the insane need employment, and that our State hospitals should be provided with large farms and numerous workshops, in order to utilize the labor of the dependent insane, is liable to be fraught with harm to the very class which it is designed to benefit. Rather would it seem the part of wisdom and the teaching of experience, to provide the insane with rest, recreation, liberal diet and protective care. Thus will their strength be preserved and built up, their energies quickened and their minds restored; or if this be no longer possible, then will their lives be prolonged in comfort, and they will be allowed to live their allotted time safe from the attacks of numerous insidious and fatal diseases.

A CLINICAL CASE.

By C. SPENCER KINNEY, M. D.,

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N. D. M. was first admitted to the Middletown State Homeopathic Hospital, November 26th, 1894, with the following history:

Age, 29; married; six children, four living; born in the United States; occupation, farmer; religion, Methodist; education, common school; intemperate sexually and with liquor; mental condition depressed on admission; fair physical health; said to be no insanity in the family; pulse, 108; tongue, coated and tremulous; temperature, 98.4; pupils, dilated; weight, 138; heart, dilated, left side; lungs, healthy; duration of attack said to be six months; remote cause, nervous predisposition; exciting cause, intemperance; diagnosis, melancholia acuta.

Up to the time he was 26 years of age, his history stated that he was a sober and industrious man, but three years ago began going in bad company, began to drink, neglected his work and ten months previous to admission became irritable, worried about his work and expenses, became suspicious of the fidelity of his wife, made threats of personal violence, drank heavily and was depressed. Last April he was thrown from a runaway team, while he was under the influence of liquor, and fell, striking on the right side of his head; was badly bruised; was smoking a pipe at the time of the accident and when he fell the stem was forced into his mouth extending nearly through his neck, making a bad wound that healed slowly. Since that accident he had shown little ambition, and his wife had to employ help to do the work he ordinarily did with ease.

On admission, he was reduced both in physical and mental health, depressed in spirits and appeared like a case of melancholia. Under treatment, he improved physically, became industrious, interested himself in the ward work, became cheerful and perfectly natural in his manner, and was allowed to go home on January 2d on parole. On February 2d, 1895, was reported as doing well and as he had no mental symptoms, he was discharged from our books as recovered.

On January 8th, 1896, this patient was re-admitted to the hospital. The medical certificate contained about all the information that was obtainable at that time. This stated that the patient was violent, dangerous, destructive, at times quite depressed, crying without cause for grief. He saw men building a house a short distance from his own, when no such event was taking place; complained of pain

in his head, had been unable to stop drinking, could not hold nor handle articles without their falling to the floor, became dazed in his mind, and at times did not know where he was. On admission to the hospital, patient was dull and acted as if under the influence of a narcotic; was confused and unintelligible in his speech; walk, unsteady; reflexes, diminished; pupils, dilated and not responsive to light; expression of face, sottish; pulse, 90; tongue, tremulous; temperature, 99, and general appearance very feeble; had no appreciation of his surroundings. Considerable importance was attached at the time of his admission to the effects of a long drive over rough roads on a cold day. Patient was at once placed in bed in the hospital department; hot milk given at frequent intervals and he was closely watched. The tendency to sleep was most marked. He could be only partially aroused, would answer questions incoherently and drop off to sleep again. Right side of head showed a neglected wound, irregular in shape, healing by granulation. The scalp was very uneven and hard, but there was no evidence of any sensitiveness on or about the wound on pressure. The outer and upper edge of the wound was five and one-half inches from the auditory meatus and from side to side the width was about three inches. No depression of bone could be found. For the next five days his condition did not change noticeably; would not feed himself, although food was swallowed when placed in his mouth; bowels constipated; enemas of hot water and oil were given every other day, and catheter used. His temperature did not vary much from 100 in the morning to 104.8 at night; pulse, 80 to 90; respiration, 20 to 30.

On January 26th, 1896, the patient's wife visited the hospital, for the first time, and gave the following report of her husband's case:

Stated that soon after he was discharged from the hospital, the year before, he began drinking and associating with some of his old companions. Things gradually grew worse with him and about two months since he was thrown from a wagon, his left side being injured. From that time, his disposition changed toward his wife and she was unable to influence him, he seeking the worst company he could find of men and women, drinking and dissipating to an unusual degree. On December 12th, 1895, he was found lying unconscious in a doorway with the right side of his head bleeding from a contused and lacerated wound, from which his wife took several bits of gravel and some dirt and dry leaves, but he was not seen by a physician for several days and no special care was taken of the wound. On being found and brought to his home, he partially revived, but was confused and showed strong tendency to sleep, so much so that his wife believed her husband had been drugged by his companions.

Up to this time the patient showed no evidence of any improvement, physically or mentally. It was impossible to arouse him so that he comprehended what was said, and he was unable to answer

more intelligently than to repeat the name of a neighboring town that he had been in the habit of visiting about twice a year for a number of years. His pupils continued dilated and irresponsive. Owing to his helplessness a great deal of care and attention was given him by the nurses both day and night.

On January 13th fomentations were ordered to be applied three times a day at regular intervals and of twenty minutes' duration; the fomentations were applied directly over the wound and changed every two minutes, after which an application of hypericum and oil, in the proportion of one to twenty, was made to the wound followed by a dry compress. The spine was rubbed thoroughly with the hypericum and oil. Within twenty-four hours after this treatment began, sensitiveness to touch became quite noticeable, together with an increase of restlessness, the patient sleeping less but not talking connectedly. On January 17th patient was looking better, but talked disconnectedly; was not able to comprehend where he was—no evidence of paralysis. On January 22d; recognized the doctor for the first time and seemed to appreciate his surroundings. (Morning temperature, 99; pulse, 80; respiration, 24. Evening temperature, 100 1-5; pulse, 84; respiration, 24). January 28th: Morning temperature, 99 2-5; pulse, 94; respiration, 28; had been slowly and steadily gaining since the hot water was applied; memory was not clear as yet. He was not permitted to talk much for fear of tiring him. January 28th: eating of his own accord. January 29th: wrote a letter to his wife. The letter was short, lines not followed and the writing resembled the effort of a paretic during intense excitement. The fomentations were continued for over three weeks and, after he began to improve, his progress was steady and healthful, and was exceedingly gratifying to those who had him in charge. He appears likely to make a good recovery.

This man had no memory of anything that occurred during the few confused hours that he was conscious after the accident. He cannot now recollect his arrival, the long ride that he took, nor anything up to the time he began to recover his memory in the hospital.

This man had many of the symptoms of concussion of the brain and his history would lead one to believe that he was suffering from it when he came to us.

His improvement I believe to be directly due to the application of hot water made over the seat of the injury. For years, fomentations have been used freely at this hospital in all cases of traumatism, sprain, threatened gangrene or in any case in which there was any evidence of a

degenerative change arising from a retarded function. In pains of a throbbing character along the spine, or in cases of neurasthenia commonly accompanied by sleeplessness, relief is found in the use of fomentations. In all these cases, the treatment should continue from twenty to thirty minutes at a time, three or four times daily, renewing application every two or three minutes and keeping the temperature as high as can be used with comfort to the patient. From my experience, I would say that the application of the fomentations, in the class of cases mentioned, and in the manner described, will promote a healthy activity of the part, and lessen unfortunate conditions to a degree not accomplished by any other single method.

FURTHER OBSERVATIONS ON THE USE OF THYROID EXTRACT IN MENTAL DISEASE.*

BY WARREN L. BABCOCK, M. D.,
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The addition of thyroid extract to the limited therapy of borderland and prolonged cases of mental disease has proven of greater value than was anticipated. We have here to confess that our faith in its efficiency at the outset was very meagre. Four complete recoveries and many improvements, which can safely be attributed to its use, have led us to abandon preconceived doubts and to adopt it as a regular course of treatment in suitable cases. When symptomatic, expectant or custodial treatment prove of no avail we do not feel justified in relegating a given case to a chronic ward until a course of thyroid treatment has assisted in demonstrating dementia, fixed delusions or incurable conditions. As high an authority as Dr. Clouston†

* *Vide* BULLETIN No. 1.

† Clouston: *Clinical Lectures on Mental Disease*. 4th ed., London, 1896.

maintains "that in large doses thyroid is of marked benefit in cases that threaten to become chronic and that no case should be allowed to become incurable without a trial of this method."

Nine carefully selected cases have been treated with the thyroid since publication of the thirteen original cases in the first number of the BULLETIN. A synopsis and summary of the twenty-two cases with results to date appear in tables appended to this report. The clinical observations recorded since first report are mostly confirmatory in character and need not be repeated. The notes which follow are offered as an addendum to former observations.

Active principle of the gland.—Baumann* has isolated a compound to which he has given the name thyroiodin. This powerful active principle is prepared by boiling the gland in a ten per cent solution of sulphuric acid and extracting with alcohol. It contains 9.3 per cent of iodine and becomes inert when the iodine is removed from it. More recent investigations by Hutchinson† seem to show that the active substance is a colloid containing an organic compound of iodine. The investigations into the chemistry of thyroid are yet in their infancy and much remains to be learned regarding its active principle. Enough, however, is known to assure us that its action as an alterative depends on its relation to the organic haloids. The chemistry of thyroid has also been studied by Fraenkel and Drechsel‡ but their results remain uncorroborated. Clinical proof of the presence of iodine is not wanting. The toxic or accumulative symptoms produced by maximum doses of thyroid closely resemble the classic symptoms of iodism. Rapid emaciation, gastro-intestinal disturbance, great thirst, irregularity of heart action and neuralgic pains are alike induced by iodine and thyroid in toxic doses. Wood§ says that "iodism is most readily produced in goitrous

*Baumann: *Ztsch. f. Phys. Chem.*, Bd. XXI, p. 319.

†Hutchinson: *Br. Med. Jour.*, March 21, 1896.

‡See bibliography.

§H. C. Wood: *Therapeutics*. 8th ed., p. 544.

persons." In this connection it is well known that thyroid has a peculiar selective influence over myxœdema and other goitrous conditions even in minimum doses, and that the maximum dose can seldom be reached in these cases. A goitre will waste under thyroid treatment as readily as during a course of the iodides. Both will equally increase the elimination of urea and stimulate the perspiratory and salivary functions.

Toxic symptoms.—Alarming symptoms were produced in the following case after taking five grains three times daily for three days:

CASE No. 1950. Male; 39 years; acute melancholia; 13 months' duration; no constitutional physical disease. Stomach and *prima via* in good order. Treatment commenced by administration of five grains. Nausea followed second dose; vomiting occurred two hours after fourth dose and persistently continued to follow each dose taken. At end of fourth day patient had lost ten pounds in weight; took scarcely any nourishment and was too weak to sit up in bed. Twenty hours later was in state of partial collapse, retching and vomiting having persisted for twelve hours uninfluenced by the judicious use of stomachic sedatives. Hands and feet cold; lips blue and facial pallor well-marked. Pulse, 120; low tension, compressible, wavy and intermittent. Respirations irregular and labored. Bowels torpid and all foods except acid fruits repulsive. Thirst intense and insatiable. Thyroid discontinued at once but patient did not rally for several days.

Symptoms of gastro-intestinal disturbance almost invariably occur when the maximum doses are reached but unless complicated with cardiac collapse, do not contraindicate a continuance of the treatment. The action of the heart should be closely watched as the influence of thyroid first becomes manifest by alterations in cardiac rhythm or marked increase in frequency of heart's beat. The following case illustrates the toxic action of thyroid directly or indirectly upon the heart muscle.

CASE No. 2305. Male; age, 19 years; stuporous melancholia of several months' duration. No appreciable cardiac disease. Treatment commenced with five grains and was gradually increased to fifteen grains without noticeably influencing patient. Discontinued for one week and again commenced at ten grains. Six weeks after initial dose patient suddenly collapsed. Pulse, low tension, intermittent,

ranging from 140 to 180 and for several days could not be counted. Heart tumultuous, irregular and fluttering. Face pallid, pinched and distressed. Extreme myasthenia and great flaccidity of voluntary muscles. Extremities cyanotic and cold. Breathing hurried, shallow and irregular. Condition extremely critical. Active stimulation with strychnine, digitalis and whisky brought about a mild reaction and he slowly began to mend. Critical for ten days but is now rapidly improving in both mental and physical health.

It will be noted that above symptoms of collapse were entirely dependent on cardiac syncope, and it is thus evident that the heart is powerfully influenced by this remedy. It may be centric in its action by influencing the origins of inhibitory nerves; or it may act primarily on the peripheral heart ganglia; or with greater probability, directly influence the heart muscle through the medium of the blood stream. The clinical symptoms of a thyroid case lead us to believe that the latter assumption is correct. The rapid wasting of voluntary muscle fibre and progressive loss of strength support the "direct action" theory which is also confirmed negatively by the absence of pronounced nervous symptoms; of cardiac palpitation and of any constant change in other inhibitory functions, i. e., respiratory, glandular and excretory. The muscular coat of the arteries is similarly affected as shown by their dilatation, by diminution of blood pressure, flushing of skin and elevation of temperature.

The "direct action" of thyroid is also confirmed by the changes in the blood. The hæmoglobin and red cells undergo more or less rapid diminution; the red cells become granular and poikilocytosis well marked.

Relapses.—That relapses in thyroid recoveries or improvements occur with a moderate degree of frequency is to be admitted; that they occur sooner than in ordinary recoveries is a matter of debate. Out of the original thirteen cases, including two recoveries and seven improvements, two only, of the latter, have relapsed. (Cases 1783 and 1948). Their noticeable but temporary improvement certainly justified their selection as cases suitable for treatment. The entirely negative permanent results allow us to now classify

them as chronic and incurable cases, whereas they formerly belonged to the doubtful class and caused us much anxiety and many qualms of conscience.

The two cases that recovered remain at their homes in excellent mental and physical health. The conclusions reached in regard to these two cases are that they are "bona fide" recoveries and present no unusual predilection to relapse. The same may be said of Cases Nos. 2243 and 1110 though with less positiveness. Relapses in "improved" cases are to be more frequently looked for, as they, like all convalescents from mental disease, manifest but a moderate degree of stability, remaining unduly sensitive to outward influences. In many of these cases dementia or fixed delusions are apparent as soon as relapse occurs. It may be justly assumed that it was present from the beginning of treatment, and, that the reaction induced by thyroid, brought the true condition of affairs to the front. In case of existing organic brain disease it is apparent that the temporary improvement is the result of over-stimulated functional activity which soon reaches a limit and then declines.

General considerations: Selection of cases.—It is an unnecessary refinement to attempt to improve known cases of terminal, organic or primary dementia or general paralysis, with thyroid. The usual course of treatment greatly reduces them in physical health and they undergo no mental reaction. The use of thyroid should be limited to doubtful or borderland cases; to prolonged cases of mania or stuporous melancholia; to cases of cerebral exhaustion following acute delirium and lastly to chronic disturbed cases other than general paralysis or epilepsy.

Length of treatment.—The average period of treatment in the 22 cases appearing in table number 3, was 26 days. This length of time sufficed to show in the majority of cases one of the following conditions—

- a. That possibilities of mental improvement exist;
- b. That dementia antedated treatment;
- c. That fixed delusions were present at the outset.

It should be kept in mind, however, that each case must

be treated individually and that no generality or fixed plan of procedure can be adopted to fit all cases.

Changes in weight.—The average loss of weight for the series was 8 pounds, but the cases varied individually from a loss of 15 to a gain of 9 pounds. A gain in weight was the exception and occurred in but two cases.

Steady progressive loss, in some instances leading to extreme emaciation, was the rule in the remainder. This loss was attended by the increased elimination of urea and other excrementitious products; by loss of appetite and often disturbance of digestion; by muscular flaccidity and loss of strength and lastly, in some cases, a clearing up of the mental processes. The gain in weight or secondary reaction following discontinuance of treatment was pronounced, in all cases, without exception. Individual gains varied from 1 to 23 pounds, while the average gain for the 22 cases was $9\frac{1}{2}$ pounds.

Duration previous to treatment.—The average period was 14 months and ranged from 3 months in a case of cerebral exhaustion following acute delirium to 5 years in a case of chronic melancholia. In the selection of doubtful cases for treatment the duration previous to admission and family history should be taken into consideration.

The results of treatment in the twenty-two tabulated cases are shown graphically in the subjoined table.

TABLE No. 2.—SYNOPSIS OF RESULTS.

Mental Condition at Commencement of Treatment.	Recovered.	Greatly improved.	Slightly improved.	Imp'd but relapsed.	No change.	Total.
Mania—prolonged attacks.....	1	..	..	1	1	3
Melancholia—prolonged attacks.....	1	..	1	..	1	3
Cerebral exhaustion following acute insanity.....	..	1	1	..	..	2
Post melancholic hebetude.....	1	1	1	1	1	5
Borderland cases, diagnosis doubtful...	1	3	..	1	4	9
Total.....	4	5	3	3	7	22

By reference to the above explanatory table it will be noticed that no particular mental condition offers greater probability of recovery under treatment than any other, not essentially chronic, unless it be prolonged attacks of the insanias, two-thirds of which recovered or improved in a total of six cases. The four recoveries are distributed throughout as many distinct mental conditions and a more extended series of cases became necessary before definite conclusions can be drawn. Generally speaking it may be stated that all included in the above table were "borderland" cases or, in other words, patients verging on dementia whose mental condition seemed near to the line of demarcation existing between curable and incurable states. All cases that remained unchanged throughout treatment have since undergone no improvement. The negative record in each of these cases has, therefore, become their certificate of chronicity.

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* The writer is unaware that a bibliography covering this subject has yet been compiled. The above is offered for the assistance of those who desire to further investigate the action of thyroid.

TABLE No 3.—THYROID TREATMENT.
SUMMARY OF 22 CASES.

Case No.	Age	Under Treatment.	Gain weight after two weeks.	Diagnosis on admission.	Condition when treatment was inaugurated.	Duration to previous admission.	Max. dose.	Max. temp.	Result.	Remarks.
	yr's.	days.	lbs.			m'ths.	gr's	deg.		
1783	23	30	23	Acute mania.	Attack prolonged.	15	12	102	Improved.	Relapsed after two months.
1807	38	24	11	Stup. melan.	Cerebral exhaust.	13	10	100.2	"	Second attack.
1841	41	30	6	Recur. mania.	Attack prolonged.	12	15	100	Recovered.	Discharged Dec. 28, 1895.
1878	37	15	0	Acute mania.	Organic dem.	10	15	101.4	No change.	Specific origin.
1931	32	31	7	Acute melan.	"	15	10	99.8	Improved.	Slightly demented.
1048	25	18	16	"	Post-melan. hebe.	11	15	99.8	"	Relapsed.
1082	33	15	?	"	Term. dementia.	19	10	?	No change.	Delusions fixed.
2005	32	7	?	Subac. melan.	Subacute mania.	8	10	98	"	Eloped.
2174	22	28	8	Stupor.	Post-melan. hebe.	11	10	100	"	Demented.
2191	19	41	13	"	"	5	15	101.2	Recovered.	Discharged Feb. 3, 1896.
2230	39	26	1	Acute delir.	Cerebral exhaust.	3	10	99.4	Improved.	Condition stationary.
2257	57	31	1	Subac. melan.	Subacute melan.	5	15	99.5	No change.	Demented: Bad heredity.
2304	26	30	8	Acute melan.	"	25	15	99.6	Improved.	Improvement slight.
2243	21	36	29	"	Stuporous.	7	15	99.8	Recovered.	Discharged April 25, 1896.
2022	53	28	1	Acute delir.	Depressed.	20	12	?	No change.	Resistive: Fixed delusions.
2168	42	21	4	Chron. mania.	Actively disturbed.	8	15	101	Improved.	Bad heredity.
2009	37	28	5	Recur. mania.	Attack prolonged.	20	15	100	"	Excitement subsided.
1110	40	20	9	Acute melan.	Actively disturbed.	31	10	100.2	Recovered.	Awaiting discharge.
1811	25	26	17	"	"	16	20	100	Improved.	Transferred from disturbed to convalescent ward.
2305	19	53	13	"	Stuporous.	6	15	99.8	"	Two treatments, relapsed after both.
1048	33	26	6	Chronic "	Dementia. (?)	60	20	100	"	Two treatments, relapsed after both.
1950	39	3	12	Acute "	Attack prolonged, greatly depressed.	13	10	98.8	No change.	Sudden collapse.

A DESIRABLE REMEDY FOR OBSTIPATION IN THE INSANE.

BY WALTER H. KIDDER, M. D.,
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To combat the severe forms of constipation, both acute and chronic, so frequently occurring, either as causative influences or consequent conditions, among the insane, we have found the administration of enemata of ox-gall in dilute solution to effect desirable results. This agent possesses great solutive power with a minimum degree of irritative action. It thus produces evacuation of the large bowel, usually unattended by pains of any severity, and with no untoward sequelæ. The action on the small intestine being purely reflex, no irritation is produced in that organ. Further, a free outlet is given and an opportunity for rest. This is in marked contrast to less bland cathartic measures, where the beneficial action is lost in the effort at recuperation from the resultant irritation.

Armour's Inspissated Ox-Gall has been used, the amount varying from one to three drams, by measure, dissolved in a sufficient quantity of water, twenty-four ounces having been the average. In several instances of severe obstruction in very feeble patients, from eight to twelve ounces only of a dilute solution has at first been administered, and followed in one hour by an injection of much larger quantity.

In a large number of cases of constipation occurring in the chronic insane of too feeble physique to easily tolerate ordinary cathartic medicines, ox-gall enemata have been given, with unfavorable results in only one instance. This was in the case of a girl, bedridden and greatly enfeebled, whose bowels had for months acted only after the administration of enemata, castor oil and salines having been found worthless in her case. After having had a number of enemata of a dram and a half of ox-gall dissolved in a pint and a half of water and given with good results at intervals of three days, one of twice this quantity was followed by

a severe diarrhoea of a fortnight's duration. Further ox-gall enemata have since been given to the patient, with no similar result.

Recently severe constipation occurring during deffervescence in a case of typhoid fever and in a case of typho-nephritis has been relieved by enemata of ox-gall. In both cases the action was bland but thorough.

As an instance of the desirability of using thorough but gentle measures to evacuate the bowels in cases of acute mental disturbance arising from auto-toxic troubles, the following case is instructive:

CASE No. 2334. Male; age 33 years; married; farmer; was admitted to the hospital Dec. 11, 1895, in a condition of acute delirium. The inception of the trouble had been very sudden and its alleged cause was worry over financial losses with consequent neglect in personal care. On the day following admission the patient was given two compound podophyllin pills. The next day, Dec. 13, he was violently disturbed and delirious, and was taking no nourishment except a small quantity of milk. No passage from the bowels had occurred in five days. The patient had slept only three hours since admission. Late in the afternoon a sufficient number of attendants to make resistance ineffectual were summoned and an enema of a dram and a half of ox-gall in twelve ounces of water was administered. Twenty minutes after a copious defection occurred, followed during the night by two more movements. On the following morning the patient was quiet, dull, but able to converse with coherence, and wanted food. A potent cause of the delirium had been removed, and the intestine left in a condition to at once begin the performance of its digestive functions.

In concluding we would emphasize the importance, not of simply emptying a constipated bowel, but of leaving the organ in a condition to resume the performance of its physiological function. To this end, for drastic cathartic medicines we substitute enemata, occasionally, where necessary, aiding the rectal injection by the administration of a laxative by mouth. For the active principle of an enema we prefer, instead of agents like glycerine and soap-suds, which act largely as unnatural irritants, one like ox-gall, whose action is physiological and which leaves in its wake physiological conditions.

A CASE OF TETANY.

REPORTED BY SIDNEY D. WILGUS, M. D.,
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The more severe forms of tetany in adults are very rare in this country. In Europe also, they are infrequent, except in Austria and in some parts of Germany, where the disease has been occasionally epidemic. Physicians of such extended experience as Weir Mitchell,* Osler,* Pepper,* Fagge,† and Strumpell‡ have seen but few cases. In his "Diseases of the Nervous System," Gowers reports 150 cases, but he fails to separate the mild from the severe form. Mild cases, limited to the hands and feet, are not uncommon.

A case of severity occurred in the St. Lawrence State Hospital in the summer of 1895, and considering the infrequency of the disease it is now reported:

CASE No. 1951. Female, aged 35, married, housewife, was admitted March 15, 1895. Nativity, New York State. Was the mother of one child, who was four years old on patient's admission. This admission was her second while undergoing a prolonged attack of acute melancholia. Her physical condition was fair and it continued so for a short time. Anæmia was pronounced, the blood examination made three days after admission showing 3,060,000 red blood cells, 10,000 leucocytes, and 40 per cent hæmoglobin. Specimens stained by Rieder's method demonstrated the presence of the marked changes usually found in severe grades of anæmia, and also a great diminution in the normal number of eosinophiles, only one being found in repeated examinations. This last is a common symptom in melancholia.§ Fortnightly blood examinations during the first five months showed no changes beyond a gradual but slight improvement in this condition. Her weight was 87 pounds and it fluctuated but little during her illness.

Within a few weeks after arrival an intractable diarrhoea developed. Notwithstanding treatment, this continued for months, and while some transient improvement was noted at times, the general course was not encouraging.

A grouping of acute insanity, uncontrollable and debilitating diar-

* Practice of Medicine, Wm. Osler, p. 965-966.

† Practice of Medicine, Charles Hilton Fagge, Vol. I, p. 662.

‡ Text Book of Medicine, Adolph Strumpell, p. 747.

§ An Article on Blood in Insanity, by E. M. Somers, M. D., in State Hospitals Bulletin, Jan., 1896.

rhoea and severe anæmia produced the best possible physical condition for the development of the "Asthenie Tetany" of Dana.*

While early in August the patient had a remission from her customary physical depression and assisted in some light work, during the latter days she again began to fail. On the thirtieth, prodromal symptoms appeared in the form of a severe chill followed by a temperature of 101 F. No subjective symptoms were obtainable. The day following, a slight amount of transient muscular rigidity developed in the forearms. A faint tremor of the affected muscles was also noted, but the symptoms were not a sufficient foundation on which to base a diagnosis. Owing to a large dose of phenacetine the evening temperature fell to 98 F. Pulse from 116 to 120 all day. Ate fairly well and complained of no pain. During September 1st and 2d, no new symptoms appeared, but the temperature was rising gradually, and the physical prostration became more profound. But on the third, unmistakable symptoms appeared: the fingers being first affected, and in a typical manner. While extended at the phalangeal joints, the fingers were flexed at the metocarpo-phalangeal articulations and the thumbs were adducted. The hands were not strongly flexed at the wrists, but they were drawn laterally toward the ulnar side. The contractures were tonic, came on with a gradually increasing intensity, lasted a variable length of time (from two to six hours), and then the power of the seizure slowly and progressively decreased. Between them there were intervals of complete relaxation. The contracted muscles were firm and elastic on pressure feeling, not unlike India rubber. Fibrillar tremors were present in the affected muscles. Temperature, 100 F. in the morning and 101 F. in the evening. Intestinal flux unchanged. Reflexes increased and jerky. Pulse ranging from 88 to 100 and of poorer quality.

The course of the disease now became more rapidly progressive, and the next day the muscles of the whole upper extremities were undergoing typical contractures, and relieved by complete relaxation between them. By the morning of the sixth, the lower limbs and the feet had become involved, while by evening the trunk was likewise affected. The character of the spasms did not change, and while they differed somewhat in the parts, and the combinations of parts, seized they always were symmetrical. Sometimes only the upper extremities were involved, but occasionally, late in the day, opisthotonos due to involvement of the muscles of the trunk was a prominent symptom. All grades of severity, as regards the number of muscles involved, ranged between these extremes. Dyspnœa, which was occasionally present, was due to the involvement of the respiratory muscles. Pulse 112 to 140 and feeble.

The following quotation from the ward notes will assist to still more

* Text Book of Nervous Diseases, p. 444.

clearly define her condition: "Sept. 6. Patient grows more feeble and helpless. Is unable to control evacuations. Has acute decubitus, with a slough as large as the hand. Almost complete loss of voluntary motion, with tremor sometimes continuous, sometimes intentional in character and typical of tetany. Both sides are affected symmetrically and the face, tongue, mouth, and occasionally the trunk. Reflexes increased; tapping the patellæ tendon produces a jerky reflex of all limbs, and trunk, and head. Triceps reflex obtained."

Taking an attack of ordinary severity, with fingers extended except at metacarpo-phalangeal joints, thumbs adducted, hands partially flexed at wrists, arms slightly flexed at elbows, toes adducted, feet in the position of talipes equino varus, the knees slightly flexed, and all of the affected muscles rigid, there is present a typical seizure. Patient did not appear to suffer extremely, even in the severest attacks.

Trousseau's symptom, and the "Facial phenomenon," failed to be recorded if secured. Owing to a defective galvanic battery, the electrical reactions were unavoidably lost.

During the day the temperature continued to rise, and registered 104 F. when at its maximum. At 6 p. m. the temperature was 103 F. The patient failed rapidly during the night, and the following morning eight days after the initial symptoms of tetany, died of exhaustion. No post-mortem research was allowed.

This case was of unusual interest, not only as one of rarity, but also as having several atypical symptoms which deserve notation.

Until the prodromal symptoms appeared there had been no fever, and as the tetany progressed the temperature increased; as there were no physical complications, by a process of exclusion we may say that the cause of the fever was tetany. Not only was this temperature very high, but to have it at all in this form of tetany is exceptional.

Dana says "Febrillary tremors are observed in the contracted muscles." They were present in a relatively mild form early in this attack, but as seen on the last day, the tremor was not only coarse, but so severe as to resemble the chill of an on-coming pneumonia.

A third symptom of more prominence than common, was the exaggeration of the reflexes. This phenomenon has been noted in a previous paragraph.

Lastly, a fatal ending of tetany is uncommon, but no doubt the end of this case was greatly hastened by the exhaustion following the terrific muscular strain, acting on a system which was already on the verge of a decline.

AUTO-INTOXICATION AND INSANITY.

By W. C. GIBSON, M. D.,
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Whatever may be said *pro* or *con* concerning the achievements of American psychiatry it will perhaps be conceded by all critics and supporters alike that there is one aim in all our aspirations and that is the welfare of mankind.

We therefore prefer to take a sanguine view of what has already been accomplished in our chosen line of work and to build high our hopes for the future. We believe the high plane of development which mental medicine has attained in recent years has been most encouraging.

Modern scientific methods have not been neglected in psychology. This is not shown merely in the wonderful improvement in the physical comforts now enjoyed by the insane, but in other respects as well. Insanity, in its various forms and phases, is no longer studied and classified from the symptomatic phenomena it presents, but rather on a physiological and pathological basis. Albeit, in comparison with other branches, the progress and development of mental medicine have been slow.

The earlier history of insanity is obviously one of ignorance and superstition. Until the beginning of this century many were the obstacles that retarded all knowledge of the mind diseased.

The Hippocratic doctrine that insanity was the direct result of physical disorders was lost sight of during the middle ages. The idea that there was a physical basis for all forms of mental maladies—that the mind, meaning thereby the brain, was subject to the same morbid processes as any other portions of the body—received no recognition.

The theory that supernatural forces were an important causal factor and that the mind was possessed with demons and witchcraft resulted chiefly in those barbarous methods adopted for its cure, namely, the gibbet and torture.

The enlightened methods of this great age of progress

have eventually brought psychiatry back into its true domain among the medical sciences. The narrow prejudices and empiricism that have characterized the treatment of the insane for so many centuries must inevitably give place to scientific study and research. The work of such men as Reil (1803), Jacoby (1822), Griesinger (1845), and Meyer (1857), investigators into the etiology of insanity, did much toward bringing about this result. They removed the obstacles that had paralyzed for so long the development of mental medicine, and demonstrated conclusively that the study of psychology could and should be conducted along the same lines as pursued in the investigations of other branches of medicine.

Meynert's celebrated treatise marks this epoch with all the exactness possible, comprehending, as it does, much of our present anatomical, clinical and pathological knowledge. The physical aspect of mental disease has been too much neglected. True science will never recognize the line drawn with so much care between the disorders of a *corpus morbosum* and an *animus morbosus*, and which we believe has done much to hinder the advancement and progress of our knowledge regarding the insane.

There is at present, however, a growing tendency among alienists to investigate more fully the sympathetic relations that no doubt exist between functional and organic disorders of the body and mental disturbances.

Among the insane, the study of the structure, function and nutrition of the brain must precede and explain the accompanying phenomena of mere clinical facts and symptoms that come daily under our observation. Not only of the brain is this true, but we should include in our investigations the entire nervous system and all the organs and functions of the body which must necessarily act in harmony and as an entity with the brain and nerve centres which should be considered and reckoned as inseparable in health and disease and all processes that ensue.

As Clouston suggests, in a recent article bearing on this subject, life and mind are the two factors of that organic

unity which constitute a real animal organism. By deduction then it follows that if this direct relationship exists, that with every organ and structure there is a direct connection with the brain, all physiological as well as pathological conditions possess an influence on that organ.

Much honor is due to the great German neurologist and alienist, Griesinger, in not only placing psychiatry on a physiological and pathological basis, but demonstrating the necessity of studying and classing all diseases of the nervous system as one inseparable whole of which insanity is only a portion.

The entire nervous system is undoubtedly concerned in insanity and completes the idea that insanity is a pathological condition.

Our knowledge is still limited, however, respecting the precise nature of the morbid processes which occur in the brain structures, but, from analogy, why may we not reasonably look to the general organism to discover, along the lines of modern pathology, a bacillus or toxin perhaps which may originate directly or reflexly the conditions existing in the insane?

The idea that insanity is frequently dependent on, or the resultant at least of, somatic disturbances, is as old as the writings of Hippocrates and Galen. To-day this theory finds eminent supporters and advocates, as illustrated in the teachings of Salmi, Krafft-Ebing, Starr and others.

In this connection, the theory of auto-intoxication as developed by Bouchard and his school in France, and applied to many forms of insanity, has appealed to us favorably, and seems to offer a most fruitful field for further investigations.

If insanity be due to some morbid process or degeneration of nerve cells or neuron, we have yet to locate the lesion, and have failed to demonstrate the exact nature of its pathology. On the other hand, if it be organic disease affecting the nervous system, then the causes we find for psychical disturbances are many.

The physician observes daily the change in the disposition, the unstable mental action, the restlessness and irritability that occur in an individual affected by the slightest physiological disturbances, as witnessed in the depression of the dyspeptic, or the exaltation of the intoxicated. He recognizes that certain physiological disturbances accompanied by pathological changes, as manifested in the menopause and puerperal conditions, stand as strong etiological factors in the production of insanity. The poisonous effects of alcohol, we know, lead, after long continued use, to absolute disorganization of the nervous system. That syphilitic infection is now held by most authorities to be the sole cause of general paralysis emphasizes the idea that insanity is oftentimes the result of toxæmic conditions present in the system.

We might go further and enumerate the psychical disturbances arising from the ingestion of drugs ultimately terminating in the formation of a "habit,"—those following not only acute febrile diseases, but which are the result of chronic disorders such as Bright's disease (*Folie Brightique*), malaria, gout, rheumatism, tuberculosis, diabetes, etc.

We ascribe the origin of insanity to many such causes. Is it not possible, should we carry our investigations further into the mysteries of the retrograde metamorphoses which are constantly taking place in all forms of organic life, we might find conditions existing that would make the theory of toxæmia as an etiological factor in mental disease most plausible?

As Bouchard says, man is a receptacle and laboratory of poisons. Pasteur was the first to demonstrate the nature of these poisonous elements called alkaloids, which he classifies as ptomaines and leucomaines. The part these substances play in the animal economy Bouchard has explained by many interesting experiments, and the results of his observations may help at least to shed a new light on the treatment of insanity in the future. Following the methods of Bouchard, recent observers have demonstrated that the various fluids in the body undergo decided modifications

in the insane. The toxic principles due either to cell disintegration or microbean products which are eliminated chiefly by the kidneys, the urine and its extractive products have, for this reason, served as the chief means by which all conclusions have thus far been reached.

At a meeting of French alienists in 1893 the importance of the subject of auto-intoxication in its relation to mental medicine was fully appreciated and served as the main topic for discussion. By applying Bouchard's theory to psychiatry and neuropathology, they arrived at the following conclusions:

First.—That the toxicity of urine is markedly increased in melancholia and diminished in maniacal patients as demonstrated by the fact that when injected into animals it produces symptoms similar to that form of mental disturbance in the patient from whom the urine was taken. This fact alone favors the idea that the toxæmia present is the cause and not the effect.

Second.—That insanity is frequently produced by toxins is affirmed by recent investigations of the acute infections, visceral and diathetic diseases.

It appears to us this is a reasonable hypothesis to assume,—that the sympathetic relation existing between all acute forms of insanity and physical disturbances is capable in the majority of cases of actual demonstration.

It may well be asked, why are not the more fixed conditions of depression or excitation, manifested in the insane, similar in kind to the more transitory mental states of delirium and coma accompanying bodily disease. We believe they are, as further investigation will prove. Already there has grown up a new system of therapeutics, the outcome of recent observations, that aims solely to combat the toxic conditions that are believed to be present. One of the most distinguished authorities in the State service testifies that "a powerful argument in favor of the origin of insanity by auto-intoxication is deduced from the fact that antiseptic and anti-infectious treatment has often given good results." It can no longer be denied that this theory

has gained ground among alienists in general, and found favor with many of our leading neurologists.

It has been amply demonstrated that endogenous toxins exist in the blood, but to counteract their pernicious effects or cause their elimination through the proper channels—the skin, alimentary tract and kidneys, beside which, we include the metabolic function of the liver,—is by far the most difficult problem we have to solve.

Various procedures and forms of treatment have been advised and tried with only mediocre results at best. Bouchard and others lay great stress on the use of intestinal disinfectants, the phenols proving most valuable for this purpose. The intravenous method of the injection of fluids has, however, successfully proven how great are the possibilities in this direction. The earliest experiments in connection with the theory of auto-intoxication were made upon animals to counteract, and, as it were, wash out, the effects of poisonous drugs and organic substances which had been previously introduced into the system: the results obtained were extremely interesting. Now, as is well known, this method has been generally adopted in the treatment of certain physical disorders. This procedure has been employed in Germany in the treatment of the insane, for the purpose of nutrition and not for the disease *per se*.

The use, however, of saline injections for the treatment of auto-infection in the insane was first recommended by Prof. Salmi, of Berne. Recently our attention was called to a method originated by Dr. Keene, of Providence, and favorably commented on in the *Lancet*, (1894). In an able article, Dr. Keene sets forth the advantages of the subcutaneous injections of large quantities of saline solution for the direct purpose of diluting and increasing the elimination of toxic elements. The efficacy of this mode of treatment we desire to illustrate by a case thus treated in this hospital.

The *modus operandi* of this operation is as follows: One quart of saline solution (.03 per cent NaCl) is introduced

beneath the skin by means of douche bag with rubber tubing attached and aspirating needle of medium size. The solution at temperature of body is injected into the loose tissues, preferably the abdomen and inner aspect of the thighs. Antiseptic precautions are employed and the skin rendered as clean as possible, the puncture afterwards being closed by cotton and collodion. The operation is attended by no difficulties whatever, and the time required for complete absorption of fluid was between fifteen and thirty minutes.

The case selected for trial and one which seemed to present the most favorable conditions, emanating as would seem from humoral disorders, was that of a girl, age 18, by occupation a mill-hand, who was admitted to this hospital some twelve months ago. At the time of her admission she was suffering from an attack of melancholia, with stupor, of about six weeks' duration. The family history obtained was very meagre. Another sister has since been admitted here presenting a striking similarity of symptoms.

The cause assigned in both cases was over-work and poor hygiene. When admitted patient appeared markedly apathetic with a tendency toward a cataleptic state. Sat as placed, with head falling on breast, refused to speak and manifested no intelligence or appreciation. Physically patient seemed emaciated, but on further examination no signs of organic disease were discovered. Skin was greasy and sallow, pulse soft and slow, respirations superficial, pupils somewhat dilated, temperature normal, tongue heavily coated, putrid saliva and mucus retained in mouth and nasal passages.

Following admission patient gradually grew worse, stupor becoming more profound; was filthy in habits; necessitated forced feeding and, finally was placed in bed, owing to her weak and exhausted condition. Repeated examination of her blood revealed marked diminution in amount of hæmoglobin and corpuscular elements. Frequent urinalyses showed a high specific gravity, (av. 1028)

quantity about normal, no albumen or casts but amount of urea greatly in excess of normal.

Despite various forms of treatment patient lapsed into a state of complete atony. Twenty-eight injections were given; one quart being introduced morning and evening for fourteen days with no appreciable discomfort. The results obtained were most encouraging. The excretory functions were first to respond; the quantity of urine was proportionately increased, the specific gravity dropping to 1010, and the amount of urea was notably lessened. Other objective changes occurred in the skin which became moist and clear, tongue clean and appetite improved to the extent that patient voluntarily fed herself and ate heartily of diet prescribed. General aspect of case seemed better, but the most decided change noted was manifested in the gradual amelioration of the stupor and lethargy that had all along marked the case.

Patient became tidy in habits and was soon sufficiently strong to be able to sit up and be dressed. She finally, rather suddenly and unexpectedly, one day spoke to the nurse, laughed and chatted in an appreciative, connected manner, which was the first time she had done so since admission.

We may briefly sum up the conclusions arrived at in this test case as follows:

First. That the psychological phenomena presented by patient could be traced directly to physical disturbances.

Second. That there was being produced an abnormal amount of toxic matter which, when absorbed, was insufficiently eliminated; hence the symptoms of auto-intoxication.

Third. That the means adopted for either wholly counteracting or rendering these toxic substances inert by diluting or washing them out of the system have proven at least partially successful in such psychoses as the case in question.

At any rate, we believe the theory of auto-intoxication offers a most fruitful field for speculation and further investigation.

NOTE:—It is only fair to state that since this paper has been in course of preparation, and within a month following cessation of treatment, patient again lapsed into a state of mental hebetude bordering on dementia. We propose, however, to resume treatment in this and similar cases, trusting that we may derive permanent results from a more extended use of the saline injections.

BONE MARROW IN ANÆMIA.

THE RESULT OF TREATMENT IN TWENTY CASES IN THE HUDSON RIVER STATE HOSPITAL.

BY DRs. CHAS. H. LANGDON AND THOMAS E. BAMFORD.

The patients selected for these observations had been under the ordinary tonic treatment consisting in the administration of cod liver oil, iron, etc., together with nutritious diet, but without any manifest improvement. They were apparently typical cases of anæmia and their general appearance indicated an impoverishment of the blood. In almost every instance, shortly after the commencement of the bone marrow treatment there was quite a noticeable improvement in the general appearance. Five of the patients treated complained of diarrhoea after taking a few doses, while two others experienced a feeling of discomfort and seemed to have a slight general malaise. These symptoms subsided in a few days, without treatment, and there was no recurrence of them. The preparations used were glycerine extract of bone marrow, 50 per cent, Armour & Co., and a preparation called carnogen (50 per cent bone marrow), made by the American Therapeutic Company of New York. These preparations were, as far as possible, given uncombined.

As it has been demonstrated as a physiological fact that the red corpuscles of the blood are to a very great extent

derived during adult life from the large pale cells in the red marrow of bone, especially of the ribs, it is therefore not illogical to expect that the ingestion of this substance, fresh and unaltered by heat, should prove beneficial in the treatment of those diseases and conditions where a deficiency of red blood globules (oligocythæmia) is a marked or noticeable symptom, and the results thus far obtained by clinicians would seem to confirm the correctness of this theory. The field for experimentation with this substance would probably be larger and more satisfactory in a general hospital than in an institution where the patients are more or less mentally unstable. In a hospital for the insane, examinations of the blood are only practicable in cases which are not attended by undue mental excitement, as the manoeuvres necessary to procure a satisfactory specimen, i. e., pricking, lancing the fingers, etc., as a rule increase mental agitation. Examinations were made in two cases where anæmia was associated with agitated melancholia. When the attempt to get blood from the finger was futile, we tried the lobe of the ear, but even then the specimen was obtained only after considerable struggling, and the subsequent increase of disturbance was so great that further attempts at examination in similar cases were abandoned.

The results from examinations conducted in this hospital, and the numerous observations made by physicians elsewhere, would seem to prove that the use of the bone marrow is of benefit in the majority of cases of anæmia, not associated with gastric and intestinal irritation, and not caused by malignant disease.

The marrow is therefore to be recommended, not only for anæmia in the quiet forms of insanity, but in all cases showing blood dyscrasia. Our experience leads us to believe that the administration of bone marrow will not interfere with any form of diet that may be indicated in the treatment of the disease of which the anæmia is a symptom. While the time employed in these experiments has been short, the results are encouraging and we have no hesita-

tion in expressing an opinion that bone marrow is useful in the treatment of cases where there is a deficiency in the number of red blood globules. All of the twenty cases treated had been diagnosed, melancholia; there were eleven men and nine women under observation. Among the men there were eight who showed a gain in weight, two neither gained nor lost, and one lost in weight. All of the women gained in weight. Six men improved considerably mentally and in five the treatment seemed to have no apparent effect on the mental symptoms. Five of the women improved mentally and in four there was no apparent change in the condition of the mind. It was noted in six cases that poikilocytes were present. Eosinophiles were found in several cases. Our conclusions are derived mainly from the analysis of the twenty cases which we have examined and although the limited number of observations made will not warrant us in making a positive statement, we are gratified with the results.

Fleischl's hæmoglobinometer and the Thoma-Zeiss hæmocytometer were used at every examination, and in some of the observations, Gowers' hæmoglobinometer and Deland's hæmatokrit, which is a blood attachment for the centrifuge, were also used, but for precision and exactness of results the two former instruments cannot be surpassed, always providing, however, that the examinations are not hurried or made in a slovenly manner.

Perhaps it will not be out of place here to briefly describe the process necessary for examination of the blood:

First.—The hæmometer should not be used by day or electric light, but only by candle or gas light. The examination consists of three parts, viz.: (1) obtaining the blood; (2) dilution of the blood; (3) examination with the instrument. The blood should be taken from the epidermis of the bulb of the finger or the lobe of the ear. The part is to be antiseptically cleaned and dried. A slight puncture is made with a lancet or a needle, care being taken that the part had not previously been compressed. Into the drop of blood that exudes we dip either end of a

small capillary tube, about eight m. m. in length and with a fixed capacity of six and one-half cubic millimetres. The complete filling of this capillary blood pipette is facilitated by holding it in a horizontal position; that is, by dipping it into the drop of blood sideways. After filling the pipette the surface of the same is to be closely inspected and if the least drop of blood be detected it should be quickly wiped off, care being taken not to interfere with the blood column in the tube. Before commencing operations the several parts of the hæmometer should be properly put together; the red glass wedge is to be set into the groove in the frame on the underside of the table plate, and the comparison vessel is to be placed in position in the table plate so that the projection of its partition wall will lie immediately above the outer edge of the glass wedge. That half of the vessel which lies over the glass wedge is to be filled by means of the glass pipette which accompanies the apparatus, with distilled or clear water in such a way, that the surface of the water will be on a perfect level, neither forming a positive nor a negative meniscus. The other half of the vessel, which can, for convenience be called the blood half, is to be one-fifth filled with distilled water and the capillary pipette containing the blood placed in it. The blood must be diluted with the water in the "blood half" by a gentle movement of the wire handle which is attached to the capillary tube. When the blood has been thoroughly mixed, which must be done quickly to prevent coagulation of the blood in the capillary tube, but without letting carelessness and accuracy suffer from undue haste, the blood pipette is raised and a few drops of water allowed to drip through it from the pipette used for filling the chamber. The blood and water should now be thoroughly stirred with the pipette handle and more water added, but never more than enough to fill this half of the vessel, the "blood half," three-fourths. Sufficient clear water is now slowly added to the blood solution till the fluid in the "blood half" is even with that in the "wedge half." The fluid of the two halves should form an absolutely level surface. A round glass

plate is now placed on top in such a way that there are no air bubbles under it. The hæmometer is to be so arranged that its pale, white reflector throws light through the comparison vessel, but too much light is not desirable as more correct and exact results are obtained from a comparatively dim light. The eye of the examiner is to be brought in a vertical line over the comparison vessel. Sometimes it is advisable to use a paper tube to connect the eye with the table plate of the hæmometer. The examiner should not take the same position to the hæmometer that he would to a microscope, but his body should be in line with the partition wall of the comparison vessel, so that the pictures of the two semi-circles will lie in the retina on the same plane instead of appearing as if one were above the other. The glass wedge is moved by means of the large hand disc behind the column till every difference in the appearance of the two halves in the comparison vessel has disappeared. These movements are made better by short, quick strokes than by a steady turning of the hand disc. It is advisable to look often into the instrument rather than long at one time. When we are satisfied that the shades of color of the two halves correspond exactly we read off the percentage from the graduated gauge which is on the inner edge of the table immediately in front of the hand disc.

The procedure in counting the red corpuscles with the Thoma-Zeiss apparatus is as follows:

To obtain the specimen of blood the same process is to be observed as in Fleischl's method. Care should be taken that no unnecessary pressure be made after lancing the finger, and too deep pricking should be avoided, or venous instead of capillary blood is apt to be obtained. When the blood trickles out, the point of the mixing apparatus is to be carefully dipped into it, and then, by means of the tube, the blood is to be sucked up to mark "1" on the glass tube, the greatest care being taken that no air bubbles enter the tube and also that the blood be not sucked past the mark "1." If any blood clings to the outside of the tube it is to be carefully wiped off. The

point of the tube is now dipped into a watch glass containing a .06 per cent solution of common salt, and the mixing apparatus is cautiously filled to the mark "101" by further sucking, care being taken also in this manœuvre that the introduction of air be avoided. The mixing apparatus being satisfactorily filled, its upper opening is closed by compression of the caoutchouc tube and the apparatus is well shaken for about half a minute, when it will be found that a thorough mixing of the blood and the salt solution has occurred, the mixing having been facilitated by the small glass ball or pearl which is enclosed in the mixing chamber. We now, by blowing into the apparatus, expel the contents of the fine tube, which consists of salt solution. A drop of the diluted blood is now deposited in the bottom of the Hayem's counting chamber and a glass cover, made for the purpose, is laid carefully over it avoiding the formation of air bubbles. After satisfying ourselves that the blood corpuscles are equally distributed in the bottom of the counting chamber, which occurs after standing a few minutes, we proceed to the microscopical examination, using a No. 6 or a No. 8 objective. We look for the partition in the middle of the bottom of the counting chamber and place it in such a way by moving the counting chamber that a surface of sixteen squares of the partition, as it is lined off, takes in the middle of the field of vision. We now begin counting the blood corpuscles. We start, for instance, at the square in the upper left hand corner and count the blood corpuscles in each square in the succession of the numbers in the drawing.

	1	8	9	16	
	2	7	10	15	
	3	6	11	14	
	4	5	12	13	

The blood corpuscles which are placed just over the partition are counted in that square into which they reach with their greatest part. We count ten of such sixteen square surfaces, add the number and divide the sum total by four; the quotient thus obtained is to be multiplied by 10,000 through which process we learn the number of blood corpuscles contained in a cubic millimetre. The proof of the arithmetical process given above is as follows: The number of blood corpuscles contained in a cubic centimetre is

$$x = \frac{m \times 4,000 \times 100}{160} = \frac{m \times 400,000}{160} = \frac{m \times 10,000}{4}$$

in which m signifies the quantity (number) of blood corpuscles counted in the 160 small squares. The same must be multiplied by 4,000 because the cubic contents of the prisma, the ground surface of which is a small square, and the height of which is the depth of the counting chamber, amount to 1.4000 cubic millimetre. Further it must be multiplied by 100 as the dilution of the blood was in proportion of 1 to 100. The product so obtained must be divided by 160, the number of counted prismae. From the reduced fraction thus obtained we get the above formula. Having finished the counting, the mixer should be thoroughly cleaned by rinsing it out two or three times with distilled water, then repeating the same procedure with absolute alcohol, and lastly, to obtain perfect dryness, rinsing once or twice with sulphuric ether. This seemingly too scrupulous cleaning is necessary, as any remaining water in the capillary would lead to an unintentional dilution of the blood sucked in and thus create a source of error.

The white blood corpuscles are enumerated in similar way to that employed for the red. A melangeur, or graduated pipette, which permits a dilution in the proportion of one to ten, is employed. Their correct counting can be greatly facilitated by diminishing the number of red corpuscles present, and this can be accomplished by using for a diluting fluid, a one-third per cent solution of

acetic acid. The diluting fluid should be colored with a small quantity of gentian violet. The white corpuscles will then appear a distinct blue color.

REPORT OF CASES.

CASE 1.—F., age 35; married; three children; native of Germany. Alleged cause, adverse circumstances. Heredity denied. Duration, three months. Diagnosis, melancholia agitata. On admission patient was suspicious and restless. Later agitated and much depressed. At times emotional and distrustful. Anæmic.

No. of hæmocytes beginning of treatment,	2,500,000	Weight,	105
" " end of first week.....	2,900,000	"	109
" " end of second week.....	3,600,000	"	112½
" " end of third week.....	3,700,000	"	112
" " end of fourth week.....	4,000,000	"	115
" leucocytes before treatment.....	12,000		
" " end of fourth week.....	10,500		
Percentage of hæmoglobin before treatment,	60		
" " end of fourth week,	75		

In this case the patient's general appearance is much better, although there is but slight improvement in the mental symptoms.

CASE 2.—F., age 34; married; one child. Alleged cause, anæmia and uterine disease. Duration, four and half months. Heredity denied. Diagnosis, acute melancholia. On admission patient was reticent, gesticulated, wrung her hands and was unable to sleep. Insomnia was a prominent symptom.

No. of hæmocytes beginning of treatment,	2,800,000	Weight,	97
" " end of first week.....	3,100,000	"	96
" " end of second week.....	3,560,000	"	97½
" " end of third week.....	4,200,000	"	100
" " end of fourth week.....	4,500,000	"	103
" leucocytes before treatment.....	14,600		
" " end of fourth week.....	11,300		
Percentage of hæmoglobin before treatment,	62		
" " end of fourth week,	80		

The improvement in this case was not noticeable until the beginning of the fourth week. Since then the patient has appeared more cheerful and although the gain in weight is slight her general appearance is improved.

CASE 3.—F., age 28; married; eight children. Alleged cause, adversity and ill health. Heredity denied. Duration, four months. Diagnosis, acute melancholia. Patient was morbidly religious on admission and for a short time had to be fed with a stomach tube.

She had delusions of a depressing nature. There was a visible tremor of the lips and tongue. Mucous membranes pale.

No. of hæmocytes beginning of treatment,	2,850,000	Weight,	109
" " end of first week.....	3,000,000	"	108
" " end of second week	3,490,000	"	111
" " end of third week.....	3,875,000	"	110
" " end of fourth week.....	4,900,000	"	113
" leucocytes before treatment.....	12,000		
" " end of fourth week.....	11,000		
Percentage of hæmoglobin before treatment,	60		
" " end of fourth week,	68		

The patient improved physically and mentally and is now convalescent.

CASE 4.—F., Age 26; married; three children; nativity, New York. Alleged cause, heredity. Duration, nine months. Diagnosis, acute melancholia. On admission the patient was extremely restless, loquacious, suspicious and at times mildly disturbed. Countenance anxious. Anæmic.

No. of hæmocytes beginning of treatment,	2,600,000	Weight,	105
" " end of first week.....	2,760,000	"	106½
" " end of second week....	3,250,000	"	107
" " end of third week.....	3,950,000	"	110
" " end of fourth week.....	5,000,000	"	111
" leucocytes before treatment.....	14,000		
" " end of fourth week.....	10,000		
Percentage of hæmoglobin before treatment,	58		
" " end of fourth week,	75		

The patient is less agitated at present. Physically much improved and the prognosis for ultimate recovery is good.

CASE 5.—F., age 33; single. Duration 7½ months. Alleged cause, heredity. Diagnosis, melancholia with stupor. Patient was anæmic and feeble. The urine was of low s. g. and contained albumin. She had the delusion that she was being poisoned.

No. of hæmocytes beginning of treatment,	3,000,000	Weight,	106
" " end of first week.....	3,700,000	"	104
" " end of second week...	4,000,000	"	105
" " end of third week.....	3,900,000	"	107
" " end of fourth week.....	4,850,000	"	110
" leucocytes before treatment not taken.			
" " end of fourth week.....	10,500		
Percentage of hæmoglobin before treatment,	65		
" " end of fourth week,	70		

During the third week of treatment the patient suffered from an attack of diarrhoea and general malaise and there was a reduction in the number of hæmocytes. At the end of the fourth week she showed a marked improvement in her mental condition and the prognosis for recovery is good.

CASE 6.—F., age 66; single. Duration one year. Alleged cause, heredity. Nativity, New York. Diagnosis, acute melancholia. The patient was dejected and morbidly religious. Showed considerable agitation. Picked at her clothing; had the delusion that poison was being placed in her food. Later she was reticent and irritable.

No. of hæmocytes beginning of treatment,	3,000,000	Weight,	145
" " end of first week.....	3,700,000	"	143
" " end of second week....	4,100,000	"	143
" " end of third week.....	4,700,000	"	146
" " end of fourth week.....	5,100,000	"	149
" leucocytes before treatment.....	12,000		
" " end of fourth week.....	10,600		
Percentage of hæmoglobin before treatment,	65		
" " end of fourth week,	70		

There is no change in the mental condition of the patient. She is reticent, confused and inactive. Prognosis for recovery, not good.

CASE 7.—F., age 47; widow; four children. Nativity, Germany. Alleged cause, shock and grief, following death of son. Diagnosis, acute melancholia. On admission patient was depressed and tearful. She was anæmic, suffered from scurvy and had a mitral systolic heart murmur. Insomnia was a prominent symptom. Sulfonal was employed as a hypnotic.

No. of hæmocytes beginning of treatment,	2,900,000	Weight,	117
" " end of first week.....	3,000,000	"	116
" " end of second week....	3,000,000	"	116½
" " end of third week....	3,845,000	"	118
" " end of fourth week.....	4,600,000	"	120
" leucocytes before treatment.....	12,000		
" " end of fourth week.....	9,690		
Percentage of hæmoglobin before treatment,	80		
" " end of fourth week,	85		

The patient's mental condition is now more stable although she is mildly depressed and suspicious. Physically improved.

CASE 8.—F., age 38; married; two children. Nativity, Germany. Alleged cause, heredity. Diagnosis, acute melancholia. Duration, one month. On admission patient was feeble and much depressed. She threatened suicide one week before admission by attempting to

jump out of the second story window. Two months after admission her condition became so feeble that she was placed in bed. There was dullness at the apex of the right lung. Temperature ranged between 100-103 for twenty days.

No. of hæmocytes beginning of treatment,	2,600,000	Weight,	107
" " end of first week.....	3,000,000	"	110
" " end of second week.....	3,700,000	"	113½
" " end of third week.....	3,900,000	"	114
" " end of fourth week. ...	4,000,000	"	117
" leucocytes before treatment.....	18,000		
" " end of fourth week.....	13,000		
Percentage of hæmoglobin before treatment,	75		
" " end of fourth week,	90		

After the second week of treatment the patient's temperature was normal. She became more cheerful, gained steadily in weight and her general appearance was much better. She was permitted to go home for a trial visit.

CASE 9.—F., age 32; married; four children; nativity, New York. Duration, five weeks. Alleged cause, grief (death of child) and heredity on paternal side. Diagnosis, melancholia agitata. On admission the patient was actively suicidal; tied strings about her neck and threatened to drown herself if possible. She had two pulmonary hæmorrhages.

No. of hæmocytes beginning of treatment,	3,000,000	Weight,	106
" " end of first week.....	3,450,000	"	107
" " end of second week....	3,400,000	"	108
" " end of third week.....	3,900,000	"	113
" " end of fourth week.....	4,100,000	"	118
" leucocytes before treatment.....	14,000		
" " end of fourth week.....	11,500		
Percentage of hæmoglobin before treatment,	75		
" " end of fourth week,	80		

At present there are no pulmonary symptoms. Patient has gained 12 pounds in weight and is less agitated though still depressed.

CASE 10.—Male; age 40; married; native of England; occupation, bookkeeper; intemperate habits. Alleged exciting cause, intemperance. Duration, three months. Form, melancholia, acute. Patient has delusions of poisoning and persecution. He is depressed, suspicious, distrustful and somewhat confused.

No. of hæmocytes beginning of treatment,	2,675,000	Weight,	117
" " end of first week.....	3,000,000	"	117
" " end of second week.....	4,500,000	"	116½
" " end of third week.....	4,512,000	"	117

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No. of hæmocytes end of fourth week.....	5,000,000	Weight, 118
“ leucocytes before treatment.....	15,000	
“ “ end of fourth week.....	12,000	
Percentage of hæmoglobin before treatment,	75	
“ “ end of fourth week,	90	

He has improved mentally and physically under treatment.

CASE 11.—Male; age 35; single; native of New York; occupation, iron-worker; habits good. Alleged causes, ill health (phthisis) and lack of employment. Duration, four years. Form, melancholia, chronic. Patient is depressed, apprehensive, fearful and hypochondriacal. He has delusions of poisoning and persecution, and aural hallucinations are often present.

No. of hæmocytes beginning of treatment,	2,700,000	Weight, 150
“ “ end of first week.....	3,300,000	“ 150
“ “ end of second week. ...	3,500,000	“ 153
“ “ end of third week.....	3,500,000	“ 159
“ “ end of fourth week.....	3,600,000	“ 163
“ leucocytes before treatment.....	14,000	
“ “ end of fourth week	13,000	
Percentage of hæmoglobin before treatment,	78	
“ “ end of fourth week,	75	

While under treatment patient improved mentally and physically.

CASE 12.—Male; age 45; married; native of New York; occupation, painter; intemperate habits. Duration of insanity, three years. Form, chronic melancholia. Alleged cause, intemperance. Patient is suspicious and has delusions of persecution.

No. of hæmocytes beginning of treatment,	2,200,000	Weight, 125
“ “ end of first week.....	2,560,000	“ 132
“ “ end of second week.....	2,822,000	“ 128½
“ “ end of third week.....	4,000,000	“ 130
“ “ end of fourth week.....	4,500,000	“ 134
“ leucocytes before treatment not taken		
“ “ end of fourth week not taken.		
Percentage of hæmoglobin before treatment,	85	
“ “ end of fourth week,	85	

This patient improved physically, though during the second week he had some diarrhœa. His general appearance is better. His delusions are unchanged in character, but patient is brighter and more active.

CASE 13.—Male; age 44; married; native of England; intemperate habits; occupation, agent. Duration of insanity, fifteen months. Form, sub-acute melancholia. Alleged causes, alcoholism and rheu-

matic gout. Patient is confused and depressed. Memory much impaired, especially for events of recent date.

No. of hæmocytes beginning of treatment.	2,300,000	Weight, 149
" " end of first week.....	2,822,000	" 149
" " end of second week....	3,400,000	" 151
" " end of third week.....	4,200,000	" 154
" " end of fourth week.....	4,700,000	" 153
" leucocytes before treatment.....	25,000	
" " end of fourth week.....	22,000	
Percentage of hæmoglobin before treatment,	85	
" " end of fourth week,	90	

Patient's general condition improved under treatment. He is brighter mentally and stronger physically.

CASE 14.—Male; age 23; single; native of Canada; occupation, upholsterer; habits, good. Alleged cause, masturbation. Form, melancholia, acute. Duration of insanity, one year. Patient is confused and apprehensive. He is apathetic and his mentalization is slow and difficult. He has aural hallucinations and delusions of poisoning.

No. of hæmocytes beginning of treatment.	2,600,000	Weight, 130
" " end of first week.....	2,800,000	" 130
" " end of second week.....	4,000,000	" 133
" " end of third week.....	4,400,000	" 137
" " end of fourth week.....	5,200,000	" 134
" leucocytes before treatment not taken.		
" " end of fourth week not taken.		
Percentage of hæmoglobin before treatment,	80	
" " end of fourth week,	90	

His physical condition has somewhat improved, but there is no special mental change.

CASE 15.—Male; age 23; single; native of New York; occupation, mill employee; good habits. Alleged causes, ill health and disappointment. Form, melancholia, acute. Duration of insanity, one year. Patient has frequent headaches. He is reticent, uncommunicative, moody, taciturn and suspicious. He has delusions of persecution and at times is irritable. His mentalization is slow.

No. of hæmocytes beginning of treatment.	2,400,000	Weight, 151
" " end of first week.....	3,000,000	" 158
" " end of second week....	3,800,000	" 160
" " end of third week.....	5,000,000	" 159
" " end of fourth week.....	5,500,000	" 163½
" leucocytes before treatment.....	22,000	
" " end of fourth week.....	20,000	
Percentage of hæmoglobin before treatment,	75	
" " end of fourth week,	90	

The improvement in this patient's case was very noticeable from the start. He gained in weight, and his general appearance became healthier. There was also a marked mental improvement.

CASE 16.—Male; age 54; single; native of Ireland; plumber; intemperate habits. Alleged cause, intemperance. Duration, three months. Diagnosis, melancholia, acute. Patient is confused and depressed, and has delusions of persecution. He made an attempt about two months ago to commit suicide by cutting his throat.

No. of hæmocytes beginning of treatment.	2,800,000	Weight, 176
“ “ end of first week.....	3,000,000	
“ “ end of second week.....	3,400,000	“ 176
“ “ end of third week.....		
“ “ end of fourth week.....	3,400,000	“ 176
“ leucocytes before treatment	not taken.	
“ “ end of fourth week	not taken.	
Percentage of hæmoglobin before treatment,	68	
“ “ end of fourth week,	75	

This patient's treatment was interrupted and the results are complicated by a severe attack of cellulitis of the left arm.

CASE 17.—Male; age 17; single; native of New York; occupation, farm laborer; good habits. Predisposing cause, heredity, (mother insane.) Alleged exciting cause, masturbation. Form, melancholia, acute. Duration, three years. Patient has aural hallucinations and delusions of fear and persecution. His mind is slow of action. He is anæmic.

No. of hæmocytes beginning of treatment.	2,725,000	Weight, 126
“ “ end of first week.....	3,150,000	“ 123
“ “ end of second week.....	4,000,000	“ 126
“ “ end of third week.....	4,000,000	“ 127
“ “ end of fourth week.....	4,300,000	“ 127
“ leucocytes before treatment.....	23,000	
“ “ end of fourth week.....	22,000	
Percentage of hæmoglobin before treatment,	65	
“ “ end of fourth week,	85	

His condition improved both mentally and physically under treatment.

CASE 18.—Male; age 48; single; native of New York; occupation, laborer; intemperate habits. Alleged exciting cause, ill-health. Form, melancholia, acute. Duration, three months. Patient is depressed and emotional. He has delusions of persecution and of a religious nature. Aural hallucinations are often present. He is thin in flesh and is anæmic.

No. of hæmocytcs	beginning of treatment,	2,225,000	Weight,	147
"	"	end of first week.....	3,525,000	" 145
"	"	end of second week....	3,500,000	" 148
"	"	end of third week.....	4,100,000	" 150
"	"	end of fourth week....	4,800,000	" 148
"	leucocytes before treatment.....	20,000		
"	"	end of fourth week.....	20,000	
Percentage of hæmoglobin	before treatment,	70		
"	"	end of fourth week,	75	

His condition improved both mentally and physically under treatment. He looks brighter. His complexion is healthier and his general appearance has improved, although there has been only a slight gain in bodily weight.

CASE 19.—Male; age 46; married; native of New York; occupation, porter; habits good. Predisposing cause, heredity (father insane). Alleged exciting cause, worry. Form, melancholia, acute. Duration, nine months. Before admission patient attempted suicide by cutting his throat. Is confused and depressed. At times very agitated. Has optical and aural hallucinations. Is anæmic.

No. of hæmocytcs	beginning of treatment,	2,250,000	Weight,	145
"	"	end of first week.....	2,800,000	" 143
"	"	end of second week....	3,200,000	" 144
"	"	end of third week.....	4,200,000	" 142
"	"	end of fourth week....	4,360,000	" 145
"	leucocytes before treatment.....	22,000		
"	"	end of fourth week.....	18,000	
Percentage of hæmoglobin	before treatment,	64		
"	"	end of fourth week,	98	

Patient improved mentally and physically under treatment. In this case patient, besides the carnogen, took several doses of morphine because of a persistent insomnia.

CASE 20.—Male; age 22; single; native of New York; occupation, varnisher; habits, good. Predisposing cause, heredity (mother insane). Alleged exciting cause, overwork. Form, melancholia, acute. Duration, three months. Patient is troubled with insomnia. He is restless, confused and incoherent. He has optical and aural hallucinations and delusions of persecution.

No. of hæmocytcs	beginning of treatment,	2,400,000	Weight,	127
"	"	end of first week.....	2,800,000	" 124
"	"	end of second week....	3,400,000	" 126
"	"	end of third week.....	3,800,000	" 122
"	"	end of fourth week....	4,600,000	" 126
"	leucocytes before treatment.....	20,000		
"	"	end of fourth week.....	10,000	
Percentage of hæmoglobin	before treatment,	70		
"	"	end of fourth week,	80	

There was no special mental change. A slight loss in weight occurred, although patient's general appearance seemed better.

TABLE SHOWING RESULTS OF ONE MONTH'S TREATMENT IN
TWENTY CASES BY USE OF BONE MARROW.

BEFORE TREATMENT.					AFTER TREATMENT.			
Sex.	Case.	Age.	Weight.	Hæmo- globin.	Hæmocytes.	Weight.	Hæmo- globin.	Hæmo- cytes.
				Per ct.			Per ct.	
F	1	35	105	60	2,500,000	115	75	4,000,000
F	2	34	97	62	2,800,000	103	80	4,500,000
F	3	28	109	60	2,850,000	113	68	4,900,000
F	4	26	105	58	2,600,000	111	75	5,000,000
F	5	33	104	65	3,000,000	110	70	4,850,000
F	6	66	145	65	3,000,000	149	70	5,100,000
F	7	47	117	80	2,900,000	120	85	4,600,000
F	8	38	107	75	2,600,000	117	90	4,000,000
F	9	32	106	75	3,000,000	118	80	4,100,000
M	10	40	117	75	2,670,000	118	90	5,000,000
M	11	35	150	78	2,700,000	153	75	3,600,000
M	12	45	125	85	2,560,000	134	85	4,500,000
M	13	44	149	85	2,300,000	153	90	4,700,000
M	14	23	130	80	2,600,000	134	90	5,200,000
M	15	23	151	75	2,400,000	163½	90	5,500,000
M	16	54	176	68	2,800,000	176	75	3,400,000
M	17	17	126	65	2,725,000	127	85	4,300,000
M	18	48	147	70	2,225,000	148	75	4,800,000
M	19	46	145	64	2,250,000	145	98	4,360,000
M	20	22	127	70	2,400,000	126	80	4,600,000

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REMARKS ON THE SCOPE AND ORGANIZATION
OF THE PATHOLOGICAL INSTITUTE OF
THE NEW YORK STATE HOSPITALS.*

BY IRA T. VAN GIESON, M. D.,
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Gentlemen:

Surely there is no chapter in the history of all medical science more replete with the record of difficult and intricate research than that which relates to the development of our knowledge of the nervous system, the noblest and most marvelously organized tissue of the body. And yet, notwithstanding the supremacy of the nervous system over all of the other organs and tissues of the body, in its wonderfully intricate organization, nowhere else in the body can we localize and establish the nature of the lesions with such fascinating accuracy as in the neural diseases. And this great mass of knowledge whereby the physical basis of the symptoms in neural diseases can be premised so accurately has been sought out by the clinician. In no department of medical science has the observation of the keen, alert practitioner been of such inestimable service to the anatomist and physiologist as in the nervous system.

However important animal experimentation and laboratory work may have been in the elucidation of questions in structure and function in the nervous system it has ever been the experiments which nature has evoked in man, in the diseases of the nervous system, that have been crucial and brilliantly decisive in the development of neuro-path-

* By invitation, Dr. Van Gieson was invited to meet in regular monthly conference, the Medical and General Superintendents of the State Hospitals and the State Commission in Lunacy and to outline the probable future work of the Institute, and its relation to the several hospitals. The Editorial Committee consider his address of value to those members of the medical staffs who were not present at the conference, and by Dr. Van Gieson's permission his address is herewith published, with the understanding that it shall be received as informal as was its presentation.

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ology, of the localization of function, architecture of the fibre systems, and many other phases of neurology. It has been the practitioner of medicine in the rush of his humane and trying duties who has again and again found such opportunities to play the rôle of the scientific pathologist as has led to the utilization of rare and decisive cases of human brain and cord lesions for the building up of our knowledge of these supreme organs so baffling to research in their intricate structure.

It would be most interesting, had we time, to review the slow, patient development of our conceptions of the structure and function of the nervous system, and trace the studies at the bedside, in the asylum, hospital and dispensary, and in the laboratory, which have contributed each in their measure, each indispensable, to the building up of this knowledge of the structure of the human nervous system and of the nature of its diseases.

It seems to be a tendency of the mind to dwell on results rather than to enquire how they were brought about. And the younger generation of pure scientists, in medicine especially, in these days of the revolutionizing achievements of the pathological and bacteriological laboratories, do not fully realize that it is to the clinician that we owe the great bulk of our knowledge of disease processes and much of physiological science. And this is especially true in regard to our insight into the structure, functions, and pathology of the nervous system. The pathologist described changes, but it remained for the clinician to interpret them; and where clinical data and pathological findings seemed at variance the clinician has given the crucial decision.

The clinicians like Türck, Duchenne, Westphal, Leyden, Erb, Broca, Charcot and Gudden have built up the knowledge of the diseases of the nervous system and have contributed much indeed to our understanding of its functions and their localization, as well as the pathways of the fibre systems. Clinicians like these explained the significance of the findings of the autopsy table; they guided the

work of the pathologist who followed the footsteps of these pioneers] in the pathways of the knowledge of the human nervous system and its diseases.

At the present time, however, work along the older lines of research in the pathology of the nervous system is well-nigh exhausted. The limitations of the previous methods of investigation, whereby so much has been accomplished by the clinician and the pathologist in explaining so well causes and morbid processes underlying many nervous diseases, have been growing painfully evident in the past few years. The great method of Golgi, the advances in minute anatomy of the cell, has given the laboratory an unexpected power and prominence in penetrating far beyond the barriers of the previous decade in elucidating neuro-pathological problems.

The whole scope of neuro-pathological laboratory work is upon an entirely different plane than ten years ago; it has an hundredfold more scrutinizing channels of investigation and rests upon a broader and more philosophical basis. Ten years ago nothing could be expected to be attained in seeking for the physical basis of mental diseases. The methods were too coarse; they revealed absolutely nothing of the wonderful microcosm in the internal organization of the ganglion cell and consequently the most minute and delicate but none the less definite and significant changes in the ganglion cells were completely ignored; and it is to some of these new conceptions of investigating neuro-pathological problems, born of new methods and precise knowledge of the normal anatomy of the nervous system, that I would invite your attention. A consideration however of the fields of application of the recently inaugurated Pathological Institute of the State Hospitals of New York involves such a broad and philosophical presentment of the whole scope of modern neurology, as well as the course of its progress for the next two or three decades, that in addressing you upon this almost limitless subject, I may well ask for the freedom of an informal speaker, rather than the attitude

of the elaborate writer. A review of the scope of the Institute would embody not only a discussion of the biology of the nervous system but also of the pathology of mental and nervous diseases, both in regard to what has been accomplished in the investigation of their causes, as well as what remains to be attained along the lines of the comparatively recently discovered and powerful methods of research. We may, then, merely sketch in outline, rather than attempt to present a complete view of the prospective lines of work of the Institute.

It is certainly fundamentally important to point out at the very beginning that no investigations of the highest order of scientific value, of the permanent and philosophical order, can be brought out of the Institute without a development that grows from a comprehensive basis. The only way to advance the knowledge of mental pathology is to study this department of neurology hand in hand with all of the other branches of neurology and to be ever mindful that it is governed by the same laws as morbid processes elsewhere in the body. Mental pathology is, therefore, to be studied in the light of general pathological anatomy.

The Institute should have a staff of scientists each of whom should be especially trained in one or the other of the specialized departments of modern neurology, for it is only by the correlation of all of these departments that the proper and valuable kind of investigation toward the solution of the causes of nervous and mental diseases can be attained. And while, of course, the chief aim of the Institute is to study the physical basis of insanity, this is to be carried out by a knowledge of the nervous system from all its standpoints, and of the general laws of pathology. If the work of the Institute, however, be restricted to the field of mental pathology and lacks the broader conception of its problems conferred by the knowledge of the other departments of neurology, the results will be comparatively useless to science for they can not be intelligently interpreted.

The pathological problems of insanity must be studied

hand in hand with general pathology, general pathology of the nervous system exclusive of the insanities, experimental pathology, physiological chemistry and normal neural anatomy, comparative anatomy and biology of the nervous system, the physiology, cytology, and cytological chemistry of the nerve cell, and bacteriology especially in its relation to the production of toxæmias of the nervous system. To this must also be added a most valuable factor of experimental pathology, namely, the effects on the nervous system of toxæmias and intoxications produced experimentally in animals. Now the intimate association of all of these departments of science is so imperative for the elucidation of the complex problems of neuropathology, that we cannot hope to make any real or lasting headway in explaining the physical basis of insanity without a reciprocal relation between them in the practical work of the laboratory.

Specialization is a valuable factor in scientific research, but its value is practically shown only in its fraction of the whole subject of pathology of which its specialty is but a ramifying branch. While specialization, therefore, is valuable for details, for the discovery of new facts and methods and extending the knowledge of any one of the head sciences, if pursued without reciprocity of associate branches, it cannot always be trusted to properly interpret these facts or obtain the ultimate goal desired of establishing causes and their laws. Hence, the Institute must not be expected, to focus its energies upon the study of mental pathology to the exclusion of other branches of neurology. It must study mental pathology, with the broad conception to be gained by investigation from the correlation of all of the sub-branches of neurology. There should be a division of all the special departments of neurology, among the permanent staff of the Institute, and the staff should be thus selected with a view of diversifying the character of its studies. Among the contemplated number of five associates in the Institute, one should have a special training in hæmatology, another in biology and embryology of the nervous system, another in physiological chemistry, still another should

have a special training to conduct and plan out work in toxæmias and intoxications of the nervous system with a special reference to the induction of these conditions experimentally in animals, and finally another associate should be a trained bacteriologist.

It is obvious then, that to conduct the investigations of the Institute along such diversified and specialized lines as these, its staff should not be entirely removed from the influences of the great centres of medical learning, namely, the laboratories, chemical, physiological and pathological of the medical colleges. It is here that the advanced methods, ideas and work invariably come out first. These institutions govern the scientific world, they make the discoveries and are foremost in the ranks of advancing science. The Institute, therefore, by maintaining relations with such institutions, receives the advantages of all the other departments of pathology necessary for this specialized department, without maintaining its equivalent in the Institute proper. If the State laboratory, therefore, is to reap the greatest possible advantages its officers should be in sufficient touch with one or more of the centres of medical learning to absorb the benefits of their diversified specialties, and apply such knowledge as an ally to the specialized work of the Institute in its broadest application.

While the State laboratory will have certain advantages in its systematic organization over the medical collegiate laboratories, it can never provide for the enormous diversity and specialization of study in force at the university centres of medical learning. This the State laboratory can never hope to attain; it can not become a university; it can not maintain a perfectly equipped physiological laboratory, for instance, with all of its apparatus as well as four or five men prominently identified with physiology, who are devoting their life-work to the elucidation of physiological problems and the teaching of this branch. Neither can it maintain laboratories of the same kind in physiological chemistry, bacteriology, general pathology, and photography.

The Institute, it is hoped, therefore, may avail itself of the benefits of the perfectly equipped departments which are in force at the medical colleges. It would seem wholly unnecessary to duplicate work the results of which can be so readily obtained by a neighborhood of laboratories.

It is entirely appropriate to emphasize the importance of the collegiate associations of the Pathological Institute, for it is a matter of fundamental value to conduct neurological investigations on a broad basis and to prevent the Institute from drifting into one specialized field of investigation at the expense of other departments of modern neurology. The fact has always asserted itself, and still does, that the real progress of science has been made in the university centres of learning, or in such institutes as have been more or less closely associated with the university, and medical laboratories isolated or excluded from university influences have invariably failed to make any signal mark on the pages of science.

The inauguration of the Pathological Institute of the State Hospitals occurs at a most felicitous period in the science of neurology for the prosecution of its work. The marvelous precision which the anatomy of the nervous system has reached within the last ten years has really been a renaissance period in the history of neurology. The present day marks an epoch in the history of the evolution of the nervous system. Our knowledge of its construction, the development and ramifications of the central nerve fibre and their connections is definite and accurate and free from the controversial obscurity of the past fifty years. It would be interesting to glance over the history of neurology for the past fifty years and pass over the great landmarks which have made our conceptions of the nervous system so precise and logical, both in its anatomy and physiology. It will be sufficient, at the present time however, to merely emphasize the precise basis of the anatomy and physiology of the nervous system, for when once the anatomy and physiology of an organ or tissue is clear or unequivocal, we are then in a position to build up knowledge

of its abnormal conditions which is lasting and useful. Thus the day is at hand to begin anew the study of the abnormal conditions of the nervous system on a clear and permanent basis, and in the next two decades, or perhaps in less time, with the rapid increase in the ranks of investigators, we shall see an epoch in neuro-pathology fully as striking as is the present one in the normal anatomy and physiology of the nervous system.

The methods of Weigert, Golgi and Nissl, together with the researches of His, Golgi, Retzius, Kölliker, Lenhossek, Cayal and their colleagues have been the prominent factors in revolutionizing our knowledge of neurology, and have opened the way for the new era in neuro-pathology. The older data in this field must be revised and the new data are now capable of intelligent interpretation. Of all of the new discoveries in method, however, which have been the real factors in gaining this new knowledge of the nervous system, Nissl's method is destined to be of untold importance, in solving new problems in neuro-pathology and interpreting the older ones. The importance of Nissl's procedure is not so much due to its innovation as a method, but that it premises exact fixation of the nerve cells, and the application of staining methods to satisfy the searching glance of modern cytology into the delicate and extremely complicated protoplasmatic and nuclear organization of the nerve cell.

Within the past ten or fifteen years the knowledge of minute cell anatomy has made vast strides, so that it is well dignified to the status of a separate science, namely, that of cytology or cellular biology.

Singularly enough, during all this time of the accumulation of marvelously searching results in the knowledge of cell anatomy, the general pathologist neglected to apply this accumulated knowledge to the solution of his own problem. He was rather more concerned with the gross and topographical distribution of lesions and the grouping of diseased cells than with the changes in the cells themselves. It is precisely, however, to these tiny units of the organs

of the body that attention must be directed in studying many of the great groups of disease which are still at the present day obscure, and due to the presence in the body of some form of poison whether it be due to the product of bacteria or to the presence of excretions or secretions produced by some of the organs of the body, or an abnormal condition of the blood, or even to a poison from an extrinsic course. Many of these poisons may at times leave coarser or grosser lesions in the body, which may be recognized by the older and less searching methods of the pathologists, which leave entirely out of view the scrutiny of very minute and delicate changes in the anatomy of the cells as individuals. Yet, in very many cases these subtle poisons frequently leave but little trace of their action, except in the organization of the individual cells of the organs or tissues of the body. The cells are not destroyed or changed in large groups or clusters and if viewed by methods which are not especially adapted to the cell itself, there appears to be no striking change in either the protoplasm or nucleus. If however, we take a case of death from many of these poisons, which seem to leave no visible trace of their action, fix and stain the cells with all of the delicate and complicated technique of the modern cellular biologist, we shall be able to bring out hidden changes of the most minute and delicate character in the parenchyma cells of the viscera. The nervous system is especially sensitive from the complex organization of the ganglion cell to the action of these several poisons, which are the cause of so many manifestations of disease, and the ganglion cells show most exquisitely the traces of many of them whether they be of extrinsic character or in the nature of toxæmias or intoxications.

While it has probably always been suspected that by far the larger majority of diseases has been due to the circulation in the body of intrinsic poisons, yet the evidence assuring this belief has been the gradual accumulation of very recent years. Long before pathology had begun to make any

advances the continued fevers, the exanthemata, syphilis, tuberculosis, rabies, tetanus, hydrophobia, in fact all the infectious and contagious diseases were naturally thought to be the manifestations of poisons which either gained access to the body or which were elaborated within the body. When the study of pathology made advances, evidences of these diseases being due to a poison were found in the occurrence of more or less extensive necroses of the tissues or organs. When bacteriology gained ground, definite micro-organisms were shown to have a causal relationship to several of these diseases, which could be induced experimentally in animals, and furthermore when it was proved that certain poisons attending the development of these organisms were absorbed by the body and were responsible for many of the symptoms, the evidence was complete and final for many individual examples of these diseases. Then a definite explanation was given for the occurrence of necroses of the tissues or organs, or the degenerations or cell proliferations which had been observed in the study of the lesions attending these diseases. Diphtheria is a most brilliant example of the perfection of our understanding of how the toxine or toxalbumen, as these poisons are termed, associated with the growth of bacteria, acts in producing the symptoms of the disease.

It now remains for pathologists to trace out much more accurately than they have hitherto attempted the actions of these toxines, upon the delicate organization of the cells as *individuals*. Some general laws must be established of the action of these toxines, not upon masses of cells in the later stages of their action, but of the initial action of the toxine upon all of the detailed structures of the protoplasm and nucleus. As studies of this kind accumulate, from the standpoint of the cytologist, we shall find traces of the actions of poisons in many of the obscure diseases of the present day which seem to leave no clue of their action, and have until recently been regarded by both the clinician and the pathologist as diseases *sine materia*. Thus, at the present day, inasmuch as the cell knowledge accumulated

by the cellular biologist within the past twenty years is being applied by the pathologist to his problems, it may be well to speak of pathological cytology in contradistinction to normal cytology, and Virchow's term "cellular pathology" used so many years ago will commence at the present time to take on a deeper meaning. By normal cytology we mean a description of all of the minutiae of the cells of the human body, followed out to an extent indicated by the specialized terminology of the modern cytologist; and by pathological cytology as applied to the human body, any and all of the changes which may affect any of these minute details of cell organization under the influence of disease or abnormal conditions.

If the cytologist has pursued his studies of the cell to such a marvelous depth as to premise a physical basis for heredity in the chromatin of the cell, the pathologist of the present day certainly has an encouraging stimulus to search out clues for the causes of the unexplained diseases. An example always makes a general statement forcible, and the history of the pathology of hydrophobia is so interesting in showing the treasures of knowledge unearthed by the application of cytological studies, that it is well worth glancing at. Until two years ago practically nothing had been found to explain the symptoms of this disease. Yet here was a disease which gave the most dramatic evidence of the extreme irritation, and even destruction, of the elements of the central nervous system. Yet, when examined by the coarser methods of general topographical pathology, practically nothing was found to give any real explanation of the symptoms. At times hemorrhages and leucocytosis about the vessels of the spinal cord and medulla were found, but the ganglion cells were found in place, properly arranged, and the impression was that here was a poison which, although it acted most violently on the ganglion cells, left no changes in them; and this is probably the impression given by most of the text-books on pathology up to within a very recent period. Now, if the nervous system from a case of hydrophobia is studied from a stand-

point of pathological cytology, a brilliant chapter can be written, which gives step by step the impress of a subtle, invisible poison on the ganglion cells, and explains with most interesting clearness just why and how the symptoms arise.

In applying the methods and knowledge of advanced cell studies to the study of hydrophobia, a perfectly definite series of changes can be observed in both the nucleus and cell body, which are almost entirely hidden from view in the coarser and older technical methods of pathology which were subservient to a topographical view of the constituents of an organ or tissue, rather than an elaborate view of the cellular microcosms composing them. By these methods the insight into the ganglion cell organization is so scrutinizing that within six hours after the onset of the symptoms when the rabid animal exhibits nothing more than fine general tremors, changes can be found in the cerebellar ganglion cells. Golgi, also, in applying his own method to the study of hydrophobia, although it certainly has not the advantages, in many respects of the application of aniline dyes to sublimate hardened material, found initial dissolution of the ganglion cell nucleus, occurring at a very early period of the disease, and simultaneously with karyokineses of the endothelial cells of the capillaries in the nervous system. Thus, we can see how cytological investigation has cleared up the manifestations of hydrophobia, and given us very positive evidence of the progressive destruction of the ganglion cells from the action of a poison. Just where this poison comes from, or to what extent a disorganized condition of the blood in hydrophobia, acts as a poison, we do not know; but it certainly is a positive gain to have discovered the action of this poison on the ganglion cells. As Golgi remarks, it is not to be supposed that these changes in the ganglion cells are positively characteristic or peculiar to hydrophobia. Undoubtedly, a variety of poisons may produce the same set of changes in the ganglion cell. The point, however, is to investigate the great mass of obscure nervous diseases, and

ascertain by these cytological methods the evidence of the action of the poison, whether it be acute, intermittent, or slow and protracted in its exhibition. It can be seen therefore, that we stand on the threshold of a new conception of investigating nervous diseases, namely, by applying methods which give us exact information about the damage which occurs to ganglion cells in diseases, and the action of poisons on constituent elements of the nervous system. Formerly we could obtain no such data as these.

It is rather singular that the very striking and complex arrangement of the minute structures should have escaped attention until such a recent date. The explanation, however, is that the unravelling of the nerve fibre pathways, together with their origins and connections with ganglion cells, entirely engrossed the attention of investigators for the past fifty years. The use of bichromate fluids in the hardening of the nervous system, upon which the methods for the solution of these problems depended, renders the ganglion cell entirely unfit for cytological study, and for this reason until Nissl, by using such a fixative as alcohol in 1885, the wonderful details of cellular structure remained unknown. Up to this time and also until quite recently, observers who devoted their attention to neuro-pathology also used these same fluids, and were completely ignorant of a host of minute changes which may take place in the ganglion cell under the influence of disease, and yet apparently leave the cell in a normal condition when viewed by Müller's fluid hardening, which entirely shuts out of view cytological alterations. Thus, we can readily understand how comparatively little progress has been made in the study of neuro-pathology, and especially mental pathology, except in regard to changes in the nerve fibres, when the ganglion cell microcosm was entirely ignored.

In brief, until very recently only the outward morphology of the ganglion cell, both in the normal and abnormal nervous system was studied, and the work of the next two or three decades will be the most brilliant in clearing up the

great number of misconceived problems of neuro-pathology, when conducted along the lines of studying the cell, not from its outward form, but by its internal organization.

Two reasons, apparently, have retarded this most fruitful application of cell methods and cell knowledge to the problems of both neural and general pathology. In the first place, the extremely specialized training, and the unfortunately complicated terminology of the cellular biologist, requires a distinct course of study on the part of the pathologist. In the second place, the cells of the human body are not as favorable objects for cytologic study as those of the lower forms of animals. One has, therefore, to attain a broad and comprehensive insight into the elaborate internal arrangement of the cells of the human body, especially the ganglion cell, and to guard against hasty or erroneous interpretations of the cytological elements, whether under normal or abnormal conditions, to devote much time to the study of general cellular biology. An investigator who desires to apply the broadening conceptions of cytology to the problems of the human body, either under normal or abnormal conditions, and to plan out work in pathology from a cytological standpoint, should visit the marine or university biological laboratories, preferably the former, and become practically familiar with all of the complicated methods of the cytologist. He should study fertilization and cleavage of the ovum in the most favorable examples among the invertebrates and lower vertebrates. The cytologist for years has spent the greatest amount of time in this field, and in it has achieved his most brilliant results. Such an investigator should also study some of the lower forms of life which have very large cells, such, for instance, as *necturus salamandra* or *amphiuma*. The cells in such forms as these have thrown a great deal of light on general cytology, and show many features or detailed cell organization much more plainly than man and the higher vertebrates.

When familiar in this way with the introductory principles of the science of the cell, he may then to advantage

begin researches in the pathological cytology of many human diseases, which are so much in need of these investigations. Thus, the work of the succeeding years, in writing out the normal and pathological cytology of the human body, cannot be done by investigators who expect to plunge at once into the complicated cellular details of any particular set of cells of the body, as the various classes of ganglion cells, for instance, without much preparatory and comprehensive work, in general cellular biology. This warning is the more forcible in studying very delicate changes in cells under abnormal or diseased conditions, for the field is almost developed in the light of the most modern ideas, and may contain many pitfalls of error for the cell anatomist who has not studied the cell in the lower form of life and with absolute perfection of technique.

Even the chemistry of the various minutiae of the nuclear and cytoplasmic organization is approaching a surprisingly accurate basis. This cytological chemistry must also be thoroughly mastered as well as the detailed structures of the internal cell structure. Malfatti and Lillienthal have shown that a series of chemical reactions, definite and concise in their graduations exist between certain basic and acid aniline dyes, and the materials composing the nuclear and cytoplasmic network. These exquisitely delicate reactions, indicating differences in the constitution, as well as in the location of certain granules or portions of the nuclear or protoplasmic reticulum must not be ignored in studying the problems of general or neural cell physiology and pathology. Finally, to consider the application of cytology to the cell which interests us most, namely, the ganglion cell, both under normal and abnormal conditions, it will be seen that these topics require investigation, with much training in general cellular biology, and should be investigated by observers who combine a thorough knowledge of minute cell anatomy with training in both general pathology and neuro-pathology. The most valuable and perfectly ideal kind of work in analyzing the complicated internal arrangement of ganglion cell structure should

come from men like Fleming, Boveri, the Hertwigs, Fol, Guignard, Van Beneden, Pfnitzner, Bütschli, Verworn and their colleagues, and Wilson and Watase in this country.

If such masters in cell anatomy combine also the training of the pathologist, and could join the two branches of research, especially in the ganglion cell, we should gain an enormous amount of knowledge that neither of the two branches of science single-handed could ever hope to attain, except in a superficial or even unreliable way.

It will be seen, therefore, that one of the most essential factors in the Pathological Institute will be to conduct these two branches of research hand in hand, and it will, therefore, be especially necessary to have one of the associates of the Institute a profound student of cytology, in order that he may direct work in the pathology and normal anatomy of the nervous system from this standpoint.

After having emphasized the value of the methods which display the minute anatomy of the ganglion cells to gain evidence of the action of the subtle body poisons, we may resort to a more specific consideration of these poisons. One particular group of these poisons was spoken of specifically, namely, the poisons which are associated with the development of bacteria within the body, and the circulation within the body of such a bacterial toxine, with its resultant effects, is known as toxæmia.

Now, hand in hand with the accumulation of the knowledge which resulted in the establishment of a group of certain poisons associated with the development of bacteria, another class of poisons has been very definitely grouped together, which are due to the retention in the body of more than the normal amount of certain secretions, or on the other hand, of an over-production of certain secretions, and these are somewhat loosely grouped together under the familiar name of intoxicants. The studies which have led up to the more definite knowledge of some of these intoxications are certainly among the most interesting experiments of the present century. The experimental work of the last several years on the thyroid gland, shows that it exerts a most

powerful influence upon the general nutrition of the body. If the thyroid be removed in dogs, a very intense poisoning occurs, and death seems to be due to the action of the poison on the nervous system. Incidentally it may be remarked that the action of this form of intoxicant on the nervous system can only be thoroughly appreciated by Nissl's method. Not only does a deficiency beyond a certain degree of the thyroid give rise to an intoxication, as in myxoedema, but an over-production or disturbance of the thyroid gland secretion may also give rise to an intoxication manifested by that puzzling and hitherto unexplained complexity of symptoms known as exophthalmic goitre. The precise nature of the investigations clearing up these two forms of thyroid intoxication, and explaining the cause of the clinical manifestations resultant from their actions, is certainly a most brilliant achievement of the past decade of medicine, and has been worked out quite entirely in the physiological and pathological laboratories.

We are led from such results to seek a similar explanation in several other obscure nervous diseases and inquire if they may not also be due to abnormal conditions of others of the ductless glands. We might expect to find in many nervous manifestations which have hitherto entirely baffled us in the search for the clue of a poison, especially with Nissl's method, evidences in the ganglion cells of intoxications like myxoedema, thyropravia and exophthalmic goitre.

Undoubtedly epilepsy is the manifestation of a temporary intoxication, which, if examined searchingly, and with a careful selection of an appropriate case for cytological study, will show traces of a poison which acts on the cortex similarly to those found in experimental thyropravia.

Unfortunately, however, we cannot expect to find any changes in the details of the ganglion cell organization, so that a series of changes due to toxæmia could be distinguished from an intoxication. We should not, for instance, expect to find in the pathological cytology of the ganglion cell any set of changes which would indicate specifically the changes due to rabies, or the changes due to thyro-

pravia. In cases of each of these diseases, the changes might be quite identical, and this is the result which the speaker has found in an extended set of researches in each of these sets of poisonings produced experimentally. The nervous manifestations in Addison's disease may also be regarded as an intoxication produced by deficiency of the suprarenal capsules. In fact, all of these hæmatopœtic organs which some years ago were grouped together as the ductless glands, the *terra incognita* of both the physiologist and pathologist, have to-day, as well as the marrow, become very important organs for investigation to both the general pathologist and neuro-pathologist, for we know that the exquisitely delicate maintenance of the normal condition of the blood depends upon these organs, and if through disease of any of these hæmatopœtic organs, the ingredients of the blood fall out of harmony, the blood itself becomes a poison and may affect the nervous system very profoundly. For instance, in Addison's disease and the various anæmias the nervous system often manifests symptoms of poisoning, which ought to be recognizable from cytological study. It is interesting to note that Lichtheim pointed out some years ago that even such extensive changes in the nervous system as sclerosis of the spinal cord had been found associated with several of the blood diseases.

It is rather difficult at present to classify these different poisons of intrinsic origin, for the simple reason that we have not as yet definite enough knowledge of them except the bacterial toxins and the intoxicants from deficient or disturbed thyroid gland secretion. Probably at the present time it cannot be stated precisely whether in thyropravia the poison is due to a failure to eliminate certain materials from the blood, or whether the blood is deprived of certain additions from the thyroid, although the former hypothesis seems the more probable. It is again difficult to know whether to classify the poisonous action of the blood in the several anæmias and leucocythemias under the head of intoxicants. The absorption or failure to eliminate noxious materials from the gastro-intestinal tract certainly comes

under the head of intoxicants. The disturbed condition of the nutrition attending insufficient food or in starvation, gives rise to a condition of the body fluids which is practically equivalent to the condition of poison. Now, it will be seen that it is exceedingly important to investigate the effects of all these forms of poisoning upon the nervous system, both for the study of pathology of insanity and ordinary nervous diseases. It is equally important to have a more precise classification of these intrinsic poisons. We might, perhaps, for our purposes of studying their effects upon the nervous system, divide these poisons in an entirely tentative classification in order to gain a working basis, as follows:

No. 1. Bacterio-toxines—These accompany or are associated with the development of bacteria within the body.

No. 2. Hæmato-toxines—Poisons due to abnormal condition of the blood as in the several anæmias and leucocythémias.

No. 3. Intoxicants, subdivided into (*a*) hæmatopœtic intoxicants, for instance, such intoxicants as evince the manifestations of myxœdema, thyropravia, Basedow's disease and Addison's disease, and (*b*) intestinal intoxicants, such, for example as cephalalgias and epilepsy (?); and (*c*) Renal intoxicants. These comprise the several materials which were not properly eliminated by the kidneys, acting as poisons: for example, cerebral symptoms of uræmia; (*d*) pancreatic intoxicants, which cause the accumulation in the system of the materials which produce diabetes and its cerebral manifestations. (?)

The condition associated with starvation, if it can be likened to a poison, also that of acromegaly or other nutritional diseases wherein lesion of the pituitary body has been suspected, as well as malaria, are difficult to classify in any of these divisions. These last three conditions perhaps had best be classified among the hæmato-toxines, unless we wish to speak of the poison of malaria as being a hematozoon toxine, a word, however, which is quite unjustifiable, for we do not know positively whether the

hematozoon malariae induces the poisonous effect of malaria by damaging the red blood corpuscles, or whether this red blood cell destruction is associated with the production of a toxine. The word cachexia is at the best a loose one, and what is indicated by cachexia and the poison producing a cachetic condition might well be placed in any of these classifications. For instance, the cachetic condition accompanying extensive tumor growths might be classed possibly as an intoxicant, a hæmato-toxine. The cachexia of marasmus would again be a hæmatone-toxine. The cachexia dependent upon a chronic suppurative condition might possibly be classed as a bacterio-toxine or hæmato-toxine. It is certainly appropriate to speak in detail of these various forms of intrinsic poisons, and even to attempt their unsatisfactory classification; for it will remind you of the very many ways indeed which the nervous system may be subjected to those changes which might ultimately lead to the several forms of insanity. The period at which the nervous system has been poisoned acutely by these poisons may be a long time in advance of the appearance of mental symptoms—so far in advance that it may have been overlooked, and yet be the direct cause in preparing the ground for insanity in later years, while leaving a stigma on the ganglion cells so that they are weakened against succeeding inroads of poisons.

(To be continued.)

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STATE CARE AND STATE MAINTENANCE FOR THE DEPENDENT INSANE IN THE STATE OF NEW YORK.

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Among the many serious problems with which States and communities are confronted to-day, there is probably none that rivals in importance, whether viewed from a medical, social, economic or philanthropic standpoint, that of securing, at a minimum of cost to the taxpayers, proper care and treatment to the vast army of dependent sufferers from that most serious, most dangerous and most far-reaching in effect of all diseases known to medical science, insanity.

Aside from its humane aspects, which must always be regarded as of primary importance, since the claims of suffering humanity take precedence of merely material or pecuniary policies, the financial side of the problem of suitable provision for the insane, involving as it does, even under the most economical methods, the expenditure of vast sums of money for lands and buildings with their equipment and furniture, besides an enormous annual outlay for maintenance, repairs, renewals and enlargements, may well command the most serious attention and organized coöperation of the legislator, the political economist, the taxpayer and the humanitarian.

Provision for the dependent insane in the State of New

York to-day represents a permanent investment by the taxpayers of, in round numbers, \$23,000,000, while the average annual expenditure for maintenance, repairs, renewals and enlargements amounts, in round numbers, to \$4,500,000. The number of insane patients supported at public expense on October 1st, 1895, was 19,369, and the number of officers and employees 115 and 3,300 respectively. Applying this ratio of cost, which is a fair average, to the entire United States, the importance and magnitude of the subject at once become apparent.

Turning for a moment to a consideration of the humane aspects of the question, it will be conceded that of all diseases which afflict mankind, insanity is by far the most frequent, most widely prevalent and most far-reaching in its effects, whether as regards the interests of the afflicted individual or of his family or the commonwealth; that a vast majority of its victims must, during its existence, be deprived of personal liberty and removed from their homes to be cared for in institutions established and maintained at public expense; that among the dependent insane are to be found numerous representatives of all professions, trades and occupations, whose financial, social and intellectual status were previously of a high order, and most of whom were respectable, self-supporting citizens—many of them taxpayers—prior to the onset of their disease; that the commonwealth is in duty bound to provide these dependent sufferers with suitable shelter, food and raiment, together with means of occupation and diversion, and competent medical care and supervision.

It need hardly be said that in the consideration of this question humanity should have the first place, but it must also be admitted that its economy must have a prominent place. Hence, it follows that that policy ought to be pursued which will, first of all, secure everything that is essential to proper care and treatment and will, at the same time, limit the cost to such sums as the truest economy for the State would suggest. In other words, the dictates of humanity demand that the insane shall be amply provided

with everything which medical science has determined to be essential to the recovery of those who are recoverable, as well as for the proper care, comfort and amelioration of those who remain unrecovered.

These premises being granted, the question naturally arises as to the best method of attaining this desirable end, having in view the demands of humanity, on the one hand, and the limitations imposed by a due regard for economy in the expenditure of public funds, on the other. In other words, how can the established requirements of a proper standard of care and treatment for the dependent insane best be fulfilled at a minimum cost to the taxpayers? For, aside from the question of humanity, the interests of true economy would demand that the utmost effort be made to secure to the insane that system of treatment and care which experience has shown, is most likely to give the best results, whether as regards the percentage of recoveries, the improvement and well-being of the unrecovered, or the cost of maintenance.

As showing the importance, as regards taxation, of making every reasonable effort to minimize the heavy burden which insanity imposes upon the State, mention may be made of the fact that in the development of the wealth of a State, the life of each individual has an estimated financial value of \$200 per annum. On the other hand, the average duration of insane life is about twelve years, and the average annual cost of properly maintaining an insane person in a public institution, including interest on investment, is about \$200. It appears, therefore, that every insane dependent represents a pecuniary loss to the State of approximately \$400 for each year that he remains under care as a public charge. Hence, if the average longevity of the insane is twelve years, and the annual per capita cost of maintenance is \$200, each insane person who fails of recovery during this period represents a loss to the State of \$2,400; whereas, a sane person for a like period of time would represent a gain of \$2,400. The mere presentation of these figures will suffice to suggest the importance, as

regards taxation, of determining and adopting that system of caring for the insane, which is likely to promote the greatest number of recoveries. But even though an individual contributed nothing to the wealth of the State when sane, it would still be in the interest of economy to provide for him, when he becomes insane, such environment and such treatment as will insure every opportunity of restoring him to the ranks of the wage-earners, or at least of enabling him to return to his home, and thus relieve the public of the burden of his support.

From the foregoing it is quite apparent that the method of care and treatment which will insure to the insane the fullest measure of benefit in these respects will, in the end, also prove the most economical. Such being the case, it becomes pertinent to consider the relative merits of the two systems of caring for the insane which have been and are still in vogue in this country, namely, "State care" and "County care."

These two systems—the one as conducted by the State and the other as conducted by counties or municipalities—having been fairly tested for many years and under favorable conditions, the comparative merits of each may be determined with sufficient accuracy. It will not seriously be claimed that both systems are equally good. Certainly one is demonstrably better than the other. Each one must be regarded as a whole, and is, therefore, not to be judged by parts, or by sporadic instances of success or failure. If, in a majority of points of comparison, either system be found inferior, that system should be everywhere abandoned and the other one adopted in its stead. The sole question, therefore, is: Which of the two systems has been shown by experience to be productive of the greatest good to the insane themselves and to the community at large?

Respecting the relative cost of each, it may be said, at least so far as experience in the State of New York has shown, that in every instance where local authorities have undertaken to establish and maintain an institution for

the insane on a *curative* or *hospital* basis, like that of a State hospital, the standard of care has in no respect equaled, even approximately, that which the poorest of the State institutions affords. Many of the keepers of these county asylums in the State of New York freely admitted that if they were required to maintain a standard of care equal to that of the State institutions, their per capita cost would largely exceed the rates then charged by the State asylums for the chronic insane. In truth, it may be said that not one of the twenty or more so-called county asylums licensed by the New York State Board of Charities prior to the passage of the State Care Act in 1890, had proper facilities in any essential particular for the care and treatment of insane patients; most of them being only parts of the poorhouse proper, and without even a resident medical officer. They were merely custodial establishments, the inmates of which were maintained in substantially all respects on a poorhouse basis, frequently in intimate association with common paupers. In a word, these unfortunate victims, many of whom were persons of respectability and refinement, were branded as incurable and then pauperized by consignment to these hopeless and cheerless surroundings. Even in the counties of New York and Kings, with their almost unlimited resources, the per capita weekly allowance for maintenance for their dependent insane had averaged from one to two dollars less than that provided for the State hospitals; while in the smaller institutions of the interior counties, aptly termed "poorhouse asylums," before their existence was happily terminated by the enactment of the State Care Law, the allowance for support was still more niggardly, they being conducted for the most part on a scale based on the minimum amount for which body and soul could be kept together. The lay keeper of one of the largest of these county establishments boasted to the writer that he maintained his insane patients for the munificent sum of ninety cents a week per capita. In connection with this subject may be mentioned a singular fact, and one that should have

not a little weight in a consideration of the relative merits of the two systems, namely, that representatives of the State always display far greater liberality in appropriating moneys for charitable purposes than do local authorities. Experience has everywhere shown that the closer the relations between the appropriating power and the localities where the moneys so appropriated are to be expended for charitable purposes, the more parsimonious the policy, a fact which has always proved disastrous to the welfare of the insane when under county or local control.

While we may freely concede that there are individual instances of county or municipal asylums which maintain an excellent standard of care, and, consequently, that an indiscriminate condemnation of public institutions for the insane not under State control would be manifestly unjust, it must also be conceded that such instances are exceedingly rare—so rare, in fact, that they may be regarded as exceptions which “prove the rule.” Certainly not one such instance was found in the State of New York. Furthermore, it matters not how high a standard of excellence a county or municipal asylum may attain, there is the ever present danger of a retrogression through changes in management, likely to occur with every turn in the tide of local politics, as the history of substantially every county asylum will show, especially if it happen to have a city population within its bailiwick; whereas, in the State hospitals and asylums of a large majority of the States, permanency in the management and in the tenure of resident officers is reasonably secure and not dependent on the favor of any political party, experience having abundantly shown that no institution for the care and treatment of the insane can be successfully conducted where partisan influences obtain. On the other hand, it is not claimed that the State hospital system as it exists to-day is perfect, or that it ever will be, for that matter. It is claimed, however, that the principle of State care is founded on the broad basis of science and humanity, and that when intelligently applied, it stands for all that is best in the present

state of medical knowledge on the subject; whereas, county care is characterized, as a rule, by the warping limitations of parsimony coupled with the abortive results of ignorance and partisan influences.

The term "State care for the insane," as it is understood and applied in the State of New York, implies State provision and State maintenance for all of the dependent insane in State hospitals, established and organized upon the following basis:

1. A division of the State by counties into hospital districts, the territorial extent of each district being determined by the number of insane to be provided for and the capacity of the hospital located therein.
2. Each hospital to receive and care for all the dependent insane of its district, whether acute or chronic.
3. A healthful, picturesque and accessible site with an abundant supply of pure water, good drainage and acreage sufficient for ornamental grounds and agricultural purposes.
4. Well constructed and conveniently arranged hospital buildings of a permanent character, equipped with modern sanitary appliances, as regards warming, ventilating, lighting, fire protection, cooking, bathing, etc., and structurally adapted to the care of both acute and chronic cases.
5. A skilled, sufficiently large and liberally compensated medical staff, including a woman physician, also medical internes in each hospital as adjuncts to the regular staff.
6. A corps of skilled nurses, trained in the hospital, in the proportion of not less than one to eight patients.
7. A liberal and varied dietary.
8. Sufficient and suitable clothing, bedding and furniture.
9. Ample facilities in the way of medical and surgical appliances, also facilities for the industrial occupation, diversion and entertainment of patients.
10. The selection and promotion of officers and employees in accordance with civil service principles, and a permanent tenure of office during fitness and efficiency.
11. A uniform system of medical and financial records for all the hospitals.
12. The removal of public patients from their homes or from poorhouses to State hospitals by trained at-

tendants of the same sex, at the expense of the State, and the statutory prohibition of all jurisdiction of superintendents of the poor over insane after they have been certified as such. 13. The whole to be under competent State supervision and to be maintained by the State by means of a general State tax levied for that specific purpose. At the present time there are in the State of New York eleven State hospitals, exclusive of the one for insane criminals, in active operation, with a daily population ranging from 500 in the smallest to 2,500 in the largest single institution and all organized substantially on the lines above indicated.

County care, as exemplified until recently in the State of New York, is characterized, on the one hand, by a lack of substantially all the above mentioned requisites for a State hospital, and, on the other, by the conditions of overcrowding, wretchedness, squalor and neglect so graphically depicted in the report of the State Charities Aid Association, an extract from which is quoted in another part of this paper.

Respecting the county care system as it existed in the State of New York in 1889, the State Commission in Lunacy in its annual report for that year said: "The conclusion of the commission regarding the system of county care of the insane is that, however feasible in theory, in practical operation it has been found to have failed and fallen far short of the hope entertained for it when the act of 1871, sanctioning its trial, was passed. As a system it has developed inherent difficulties and defects which seem to be ineradicable and which make its successful operation in all essential respects impossible. Such being the case, it ought to be abolished and the policy of State care for all of the insane, both acute and chronic, should be re-established at the earliest practicable day. It cannot be said that the system of county care has not had a fair trial. It has been in vogue since 1871 under exceptionally advantageous circumstances. During all that time it has had the advantages of State supervision and yet it has failed to meet every reason-

able or just expectation. If the system has been a failure for nearly twenty years, is it not reasonable to conclude that it is likely to be a failure for all time to come? It is not claimed that the system of State care as now conducted is perfect, but that it is steadily progressive, is humanely and intelligently administered, and that it represents all that is best in the present stage of medical knowledge upon this subject; and whatever other criticism may be passed upon it, it certainly cannot truthfully be said that the inmates of the State hospitals are not comfortably housed, sufficiently clad, properly fed, provided with sufficient attendance and care, and given medical supervision and treatment of an exceptionally high order."

The State Care Act, whereby the odious system of county care in the State of New York was finally annihilated, originated with the State Charities Aid Association, a voluntary, non-sectarian organization, founded in 1872 and composed of representative men and women of nearly every county of the State, whose worthy object is "to bring about reforms in our public institutions of charity through the formation of an intelligent, educated and organized public opinion." To the untiring efforts of this Association, and especially to the chairman of its committee on the insane, Miss Louisa Lee Schuyler, on whose shoulders the mantle of Miss Dix, so far as regards the interests of the dependent insane in the State of New York, has so worthily fallen, is largely due the success of the movement which it originated and which finally culminated on April 15th, 1890, when the bill for State care and State maintenance of the dependent insane became a law by the formal approval of Governor Hill. This has been known ever since as the "State Care Act."

Referring to the condition of the insane, under the county care system, the State Charities Aid Association in its first annual report to the State Commission in Lunacy in 1893, among other things, says: "Very early in our history we were called upon to define our position and decide whether the influence of the association should be thrown in behalf

of State care or county care for the dependent insane. There was no hesitation. The memory of Miss Dix's earnest plea, of Dr. Willard's strong denunciation, of resolutions of medical societies and reports of legislative commissions, the traditions of the entire reform element of the State—all were to be found on the side of the removal of the insane from the poorhouses, of placing them under the care of the State. Stronger than any other theory born of tradition was the testimony of the visitors of the association, as eye-witnesses of the sufferings of these poor and neglected people. Hungry and cold, sitting in the dark through the long winter afternoons and evenings, 'because light was too expensive,' cowering in cells, stifling in attics, without proper medical attendance, overworked on county farms, or brooding without occupation in crowded wards, ordered about by rough, pauper attendants, they were of all beings most miserable. Shall we soon forget the insane man, crouching in a dark cell, so small that he could not stand up in it; or the woman, in midwinter, nearly frozen by the broken window, 'it was useless to mend it, she always broke it again;' or the one tablespoonful of fish and one potato, called a meal, while water spilled in the same room froze upon the floor; or the foul wrongs suffered by those unprotected women; such cruelties one can never forget. That the worst abuses were corrected in many places, as the years went by, is a matter of record, and yet, eighteen years after our visitors began to know what the inside of a poorhouse meant for the insane, as one reads the first annual report of the Commission in Lunacy, written in 1890, glowing with indignation as it recounts the sufferings of these poor people, one is surprised to find how little progress had been made in all those years. The system of poorhouse care has proved itself radically defective. Thank God! this horrible system is now a thing of the past."

The relative merits and demerits of the two systems can only be determined by a consideration of the general results of each, without reference to any particular institution,

whether State or county. If it appears that the principle of State care is wrong, or that as a system it is inadequate, it should speedily be abandoned, no matter how great the outlay has been; and, logically, the same ruling would apply to county care, for it must be assumed that the people of every commonwealth are willing to provide for their dependent insane everything which medical science has determined to be essential for their proper care and treatment.

Among the objections raised by the advocates of county care was the contention that the State could not legally assume control of the dependent insane; that to do so without the assent of local governments would be a usurpation of the latter's constitutional right, as well as a violation of the principle of "home rule," the local authorities in one county even going so far as to resist the order issued by the commission for the transfer of its insane to a State hospital by appeal to the courts, their contention being that the State Care Act, which required them to relinquish the control of their dependent insane to the State, was unconstitutional. Suffice it to say that the law was upheld in every court, from the lowest to the highest.

The State is defined by Woolsey as "a community of persons living within certain limits of territory, under a permanent organization which aims to secure the prevalence of justice by self imposed law." "The State," says Bluntschli, "is humanity organized."

That the State is sovereign in all matters which are not in conflict with the constitution and statutory laws of the federal government, and that in its sovereignty it may rightfully undertake any enterprise that it can better manage for the general good than can individuals, are well-established principles which have been universally recognized and accepted. The very word "State" involves the relegating of locality to the background for the public good. The State predominates because of a universally recognized necessity, amply attested by all human experience, that localism for certain purposes must give way to prevent disorganization; and while we may concede in local affairs all

that may properly be claimed for the principle of local self-government, there are interests with which only the superior powers and resources of the State can successfully cope. That the insane are peculiarly the wards of the State, holding a relation to it substantially similar to that of children to parents, and therefore not the wards of a county or of a township or municipality, is an equally well-established principle, which has repeatedly been enunciated by both common and statutory law and upheld by judicial decisions. Granting the tenability of the position here taken, and it is assumed that this will not be questioned, it logically follows that the State has the right at any time to assume the custody, control and supervision of her insane dependents, even though she may theretofore have permitted them, either in part or in whole, to remain under the control of municipal or county authorities. Furthermore, since insanity is a disease which, unlike every other, requires, as incident to its proper treatment, that the sufferer from it shall, as a rule, be deprived of his liberty, the State is justified in adopting special measures for the care and treatment of the insane, which would not be warrantable in regard to any other class of its citizens.

"No State system for the care of the insane," says Stephen Smith, "can be considered complete in all its details, which does not provide for an independent supervision of all of the insane and of the institutions devoted to their custody. This supervision should represent the sovereignty of the State in the relation of guardian to ward, and should be clothed with powers adequate to prevent wrongs and to secure the welfare of the objects of its care. This purpose can be effectually accomplished only by completely separating these institutions and their supervision from all other classes of public charities and organizing them on a basis which secures direct and independent supervision by the State."

The movement for State care for the dependent insane in the State of New York, which culminated in the enactment of the State Care Law in 1890 and which was

finally consummated in 1896, by the conversion of the New York City Asylums for the insane, with their 7,000 inmates, into the Manhattan State Hospital, was really begun in 1836 when the legislature, in response to a petition from the State Medical Society for a suitable State asylum for the insane, established the State Lunatic Asylum at Utica, now the Utica State Hospital. Prior to that time the dependent insane, both acute and chronic, were kept in county and town poorhouses, there being no other public provision for them. Unfortunately, it was provided in the original charter of the Utica Asylum that patients who failed of recovery after a given period of time might be removed to the poorhouse, upon the superintendent's certificate that they were "incurable," or "not likely to be benefited by further treatment in the asylum and could probably be made comfortable in the poorhouse." The inhumane practice of removing these unfortunates from asylum to poorhouse, usually at the end of one year, continued under certain modifications, though with practically the same results, for upwards of half a century, or until the creation of the State Commission in Lunacy in 1889, and the enactment of the State Care Law in 1890; notwithstanding the establishment during this period of five additional State asylums, namely, at Poughkeepsie, Middletown, Buffalo, Willard and Binghamton, the latter two being for the chronic insane only. Thus, while the State had recognized the principle and, at least theoretically, adopted the policy of State care for its dependent insane, it had tolerated a system of county care in its worst form by permitting the removal from State asylums to county institutions, under the guise of incurability and harmlessness, the friendless, the violent, the filthy and infirm, and the feeble and helpless—the class of patients which above all others needs the fostering care and protection of the State. Under this pernicious system the so-called county asylums and poorhouses became filled to overflowing with insane patients whose "treatment" was limited to a mere pretense of custodial care.

The establishment in 1865 of the Willard Asylum for

the Chronic Insane; now the Willard State Hospital, marked a second era in lunacy legislation, namely, that of *State Care for the Chronic Insane*, but largely failed of its object owing to delay in providing State accommodations for this class. It contemplated the removal of the chronic insane from all the counties to the custody of the State, excepting those in New York, Kings and Monroe counties, where regularly organized asylums had been provided. The general lack of accommodations in the State asylums furnished a basis for appeals to the legislature by county officials and others for exemption from the Willard Act, and exemptions were accordingly granted to several counties by special acts. The State Board of Charities, a body then having jurisdiction over the insane, also sought and obtained legislative authority to license counties to care for their chronic insane under such conditions as it might impose. Under exemptions granted by this board, a majority of whose then members were advocates of separate provision for the chronic insane—either in State or county institutions—nineteen counties established so-called county asylums, which, with a single exception, were located adjacent to poorhouses, of which they were an integral part, being under the same management and on the same basis as regards medical service, and the standard of care generally. One of the worst evils of this system, aside from the wretched surroundings and care to which it consigned large numbers of the dependent insane, was the practice of receiving recent and presumably curable cases directly from their homes, which was a clear violation of law. Furthermore, it substantially pauperized all who failed of recovery after a year's residence in a State asylum.

Referring to "the pernicious legislation of 1871," the State Charities Aid Association, in one of its reports said: "County after county applied for and obtained exemption from the Willard Act. By October 1, 1887, nineteen counties had thus been authorized to keep their milder cases of insanity. It is true these exemptions were granted

by the State Board of Charities under promise from the counties 'to give their insane just as good care as the State gave'—promises, alas! never kept. No longer, as of old, were the chronic insane to go from poorhouse to State hospital, but from State hospital to poorhouse. Gradually, year by year, and so slowly that we scarcely realized it, the poorhouse officials were tightening their grasp upon these poor people, until suddenly we were confronted by the alarming fact that the supervisors of one-third of the counties were arrayed in favor of the poorhouse system."

This was the condition of affairs when, in 1889, the State Commission in Lunacy was created, a step which gave a powerful impetus to the State care movement. To the Commission, among other things, was transferred the power hitherto possessed by the State Board of Charities in the matter of granting exemptions from the Willard Act. It is needless to say that the Commission promptly declined to grant any further exemptions to counties to care for their insane. On the contrary, in its first report to the legislature it laid bare the wretched condition of the county institutions and their inmates which a single tour of inspection had vividly revealed, and recommended the abolition of the county care system and the transfer of the inmates of all the so-called county asylums to State hospitals, there to be maintained solely at the expense of the State.

This report, it is generally conceded, gave the death blow to county care in the State of New York. The proposition to provide State care and State maintenance for all of the dependent insane, which had previously been advocated by the State Charities Aid Association, was favorably received by a large majority of the people of the State. It was heartily endorsed and advocated by the press with but few exceptions, while substantially all of the managers and superintendents of State hospitals gave it their cordial support.

Following this first report of the Commission, the State Charities Aid Association, under the able leadership of

Miss Schuyler, again and for the third time brought forward its bill for State care, and this time succeeded in passing it, in spite of "organized, vigorous and determined opposition emanating from supervisors and superintendents of the poor of exempted counties."

Of this law the *American Journal of Insanity* for April, 1890, says: "The State Care Bill providing State care for all the dependent insane in the State of New York, became a law April 15, 1890. By signing this bill Governor Hill consummated one of the most signal triumphs ever achieved by humanity in the State of New York. All honor to those good men and women who have labored zealously day in and day out for the past three years to bring about this happy result. In the general rejoicing there will be no caviling as to who is entitled to the lion's share of the credit, though all must recognize the important part played in this great reform by the State Commission in Lunacy."

The important features of the State Care Act (Chap. 126, Laws of 1890) and of acts supplementary thereto, may be briefly summarized as follows: The abolition of separate institutions for the *chronic* insane; the designation of all the public institutions for the insane as State hospitals; the division of the State into hospital districts, and requiring that each hospital shall receive all of the dependent insane within its district, whether acute or chronic; providing for the erection on the grounds of the State hospitals of additional buildings to accommodate the insane inmates of county asylums, then numbering nearly 2,300, at a per capita cost, including equipment and furniture, not to exceed \$550; requiring county superintendents of the poor and others of similar jurisdiction to properly prepare patients for removal to hospitals by seeing that they are in a state of bodily cleanliness and comfortably clad in new clothing throughout, in accordance with regulations made by the President of the Commission; providing that the removal of public patients from their homes or from poor-houses shall be done by trained nurses sent from the hos-

pitals, and that female patients, unless accompanied by relatives, must be removed by female attendants, the cost of removal in all cases to be borne by the State; that after such patients have been delivered into the custody of the hospital officials the care and control of county authorities over them shall cease; that thereafter no insane person shall be permitted to remain under county or municipal care, but all such shall be transferred to State hospitals without unnecessary delay, there to be regarded and known as the wards of the State; also absolutely prohibiting the return of any insane person from a State hospital to the care of county officials; requiring the commission, whenever deemed necessary to prevent overcrowding, to provide additional accommodations on the grounds of existing hospitals, or, if deemed more expedient, to recommend the establishment of additional State hospitals in such part of the State as in its judgment will best meet the requirements; providing that no money shall be expended by the managers of a State hospital for additional buildings or for extraordinary repairs and improvements, except upon plans and specifications approved by the commission; also, that no expenditure for any other purpose shall be made by the hospitals except upon itemized estimates approved by the commission; requiring the hospitals to submit to the commission monthly itemized estimates for their current expenditures, these estimates to be revised by it as to quantities, quality and cost of supplies; requiring the commission to classify the salaries and wages of officers and employees of the hospitals on a basis of uniformity for similar ranks and grades of employment, the schedules of salaries and wages to be approved by the Governor, Comptroller and Secretary of State; requiring uniformity in all official books and forms used by the hospitals; providing for the establishment by the commission of a pathological institute to be located in the city of New York and to be maintained for the benefit of all the State hospitals, the Director of the institute to be appointed by the commission, after a special

civil service examination, at an annual salary to be fixed by it subject to the Governor's approval.

The legislature of 1895 discontinued the practice of making special appropriations for the hospitals, separately, for repairs, improvements, renewals and enlargements, by increasing the tax levy for the support of the insane sufficiently to cover all these purposes. It provided that the commission should supervise the expenditure of this fund to the extent of determining the respective needs of the hospitals from time to time and apportioning to each from the general fund such sums as it might deem necessary, the moneys so apportioned to be drawn and expended under special estimates to be approved by the commission. During the past year steps have been taken for the care of insane convicts apart from patients held on criminal orders, provision having been made for the erection of a suitable hospital building for insane convicts on the grounds of one of the State prisons. This will remove from the Matteawan State Hospital a most troublesome class of inmates and at the same time relieve its seriously congested condition.

Since the passage of the State Care Act, in 1890, the three county asylums that were exempted from its provisions, namely, Monroe, Kings and New York City, have been acquired, and now constitute, respectively, the Rochester, Long Island and Manhattan State Hospitals. A second homeopathic State hospital has also recently been established at Collins, Erie county, thus making, in all, exclusive of the Matteawan institution, eleven State hospitals with a population, in round numbers, of 20,000 patients and 3,500 officers and employees.

The approval by the Governor during the month of May of the bill entitled "The Insanity Law," has placed upon the statute books a consolidated revision in one comprehensive act, of all pre-existing laws relating to the insane.

The Insanity Law consists of five main divisions or "Articles." Article 1 defines the meaning of the terms poor person, indigent person, patient and institution, as

used in the act. It also defines the method of appointment, qualifications, terms of office, salaries and allowances, and powers and duties of the commissioners in lunacy. Article 2 defines the titles of and reorganizes the existing State hospitals on a substantially uniform basis, as regards the numbers and powers and duties of managers, the powers and duties of superintendents, stewards and treasurers, and the monthly estimates and methods of expenditure and accounting. It also provides for the licensing of private institutions by the commission. Article 3 relates to the commitment, custody and discharge of the insane. Article 4 pertains to the organization and management of the Matteawan State Hospital for Insane Criminals and the commitment to and discharge of patients therefrom. Article 5 enumerates the laws repealed and provides that the act shall take effect July 1st, 1896.

One of the commendable features of this new law is that it definitely defines the powers and duties of supervisory and administrative officers, and distinctly fixes the responsibilities of each class, including the commissioners in lunacy, boards of managers, superintendents, stewards, treasurers and all officials having to do with the commitment of the insane.

The Commission in Lunacy is charged with the execution of the laws relating to the custody, care and treatment of the insane, not including feeble-minded persons and epileptics, as such, and idiots. It is required, among other things, to maintain an effective visitation and inspection of all institutions for the insane, both public and private, to examine into their methods of management, the condition of the buildings and grounds, the books and records, stores and food supplies and the general and special dietaries; also to determine the fitness of officers and employees for their respective duties; to see, as far as practicable, all the patients, to grant private interviews to such as require it and to inquire into complaints if any be made. To this end the commissioners are given free access at all times to the grounds and building, and to all books

and records of the institutions; and all persons connected therewith are required to give such information and afford such facilities for examination or inquiry as the commissioners may require. The commission is further authorized to make such recommendations respecting the management or improvement of the institutions as it may deem necessary or desirable, and to approve, as to form, the books of record and blanks for official use, which shall be uniform for all the hospitals; also, to make such regulations respecting the correspondence of the insane in custody as in its judgment will best promote their interests, but patients shall be allowed to correspond without restriction with the county judge and district attorney of the county from which they were committed.

The commission is empowered to define the hospital districts and to modify the same from time to time to meet the requirements of the service. It is required to keep a record in its office of all qualified examiners in lunacy and of all admissions, discharges, transfers, etc., of patients in the various institutions for the insane. It is also required to establish a pathological institute and to appoint a Director thereof, who shall, under its direction, perform such duties relating to pathological research as may be required for all the State hospitals.

The Governor is empowered to appoint, with the advice and consent of the senate, a board of managers for each hospital consisting of seven members, all of whom shall reside in the hospital district. The managers of the two homeopathic hospitals, however, may be appointed from any part of the State; also, the Middletown Homeopathic Hospital is permitted to have thirteen managers.

Subject to the statutory powers of the commission the managers are given general supervision and control over their respective hospitals. They are required to take care of the general interests of the hospital and to see that its design is carried into effect according to law and to its by-laws and rules which they may make. They must maintain an effective inspection of the hospital, visiting it at regular

intervals for that purpose; keep a record of their proceedings, and send a copy of the same to the commission within ten days after each meeting; and make a report to the commission in October of each year, instead of annually reporting to the legislature as heretofore. Appointments by managers are limited to superintendents and treasurers. Each board of managers is empowered to appoint, subject to civil service rules, as often as a vacancy occurs, a superintendent who shall be a well educated physician, a graduate of an incorporated medical college, and of at least five years' actual experience in an institution for the insane. The superintendents and assistant physicians of homeopathic hospitals for the insane shall be homeopathic physicians, but such physicians shall not be eligible to appointment in or transfer to State hospitals that are not for homeopathic treatment. Superintendents and treasurers of State hospitals are subject to removal by a vote of a majority of the board, for cause stated in writing, and after an opportunity to be heard.

Superintendents are empowered to appoint, subject to civil service rules and without confirmation by the managers, their co-resident officers and all subordinate employees, the number of each class to be determined by the commission; also, to remove any resident officer for cause stated in writing, after an opportunity to be heard. He may discharge any of his subordinate employees in his discretion.

The granting to superintendents of this power of appointment and removal of subordinate officers and employees recognizes a principle for which the Commission in Lunacy has long contended. In its first report (1889) under the head of "Official Responsibility," it said: "The superintendent or chief medical officer of every asylum should be clothed with the absolute power of appointment and removal of all officers subordinate to himself. It is doubtful if the best results can be obtained under any other system. As the law now stands, boards of managers or trustees of the State asylums have the power of appoint-

ment of the superintendent. The power is also given to them to appoint, on the nomination of the superintendent, all of the resident officers, so called, that is, the assistant physicians, steward and matron; and while the superintendent may, for cause, temporarily suspend a resident officer, the right is reserved to the managers to confirm or disapprove such suspension. Instances are not wanting of discord between the superintendent and resident officers. This is not as it should be. The superintendent should be held to a strict accountability for the acts of his subordinates; but he cannot be so held unless he is possessed of the power of appointment and removal. The existing method tends to weaken discipline, to produce a want of harmony, and to create constant friction. The superintendent is appointed on the theory that he is competent for the position. If he is competent, he should be allowed to select and remove his subordinates. If he is not competent, he should not hold the position.

Under the new law the superintendent is the chief executive officer of the hospital, and, subject to the rules and regulations established by the managers, has the general superintendence of the entire hospital and its equipment, and the direction and control of all persons therein. He is required to maintain an effective supervision of all parts of the hospital, and to generally direct the care and treatment of the patients. To this end he must personally examine each patient within five days after admission, and regularly visit all the wards or apartments for patients at such times as the rules of the hospital shall prescribe. He shall also establish and supervise a training school for nurses and attendants.

Superintendents, or their representatives, (first assistant physicians or stewards,) are required to meet the commission in monthly conference at its office in Albany to consider the hospital estimates and other matters relating to the care and maintenance of the hospitals.

The steward, under the direction of the superintendent, shall make all purchases and be accountable for the care-

ful keeping and economical use of all stores and other articles belonging to the hospital.

Perhaps the most radical change created by the new law is that which relates to the commitment and detention of the insane, a change which doubtless owes its origin to the popular delusion that commitments of sane persons to institutions for the insane are of frequent occurrence. This change, it is proper to say, was neither suggested nor approved by the Commission in Lunacy, nor, as far as the writer is aware, by any of the hospital superintendents. Furthermore, there was no demand for a change among the general medical profession. On the contrary, it was generally conceded in medical circles, and especially by those who are engaged in the care of the insane, that the supplanted method afforded ample protection from danger of commitment of sane persons through wrongful intent or corrupt collusion. The former method of commitment was by the certificate of two qualified examiners approved by a judge of a court of record, discretion being lodged in the court to require further evidence of insanity, or to call a jury to determine the question. The writer, in his official capacity, has examined thousands of cases of alleged illegal detention without finding one in which the allegation was well founded. Moreover, during a period of twenty-six years of professional and official connection with institutions for the insane in the State of New York, not a single authenticated instance of the commitment of a sane person from bad motives, has come to his knowledge. And while it may be said that mistakes in the diagnosis of insanity, as in other diseases, occasionally occur, such mistakes are exceedingly rare, as shown by the hospital records, and, when made, are speedily discovered and corrected. In connection with this matter, attention is called to the fact that under the new law, the commitment becomes a judicial order instead of being, as heretofore, a mere approval by the judge. This should afford a protection to medical examiners against damage suits for "false imprisonment" or malpractice.

Under the new law no person can be committed to an institution for the insane except upon an order of a judge of a court of record, such order being granted upon a verified petition containing a statement of facts upon which the allegation of insanity is based, and a certificate of lunacy signed by two qualified examiners in lunacy. Notice of application for the order of commitment must be served upon the person alleged to be insane, at least one day before making the application, but the judge may dispense with such personal service or may direct substituted service to be made upon some other person to be designated by him. He may also, in his discretion, require other proofs in addition to the petition and certificate of the medical examiners, or a hearing may be had by the judge to whom the application is made upon the demand of any relative or near friend of the alleged insane person. Furthermore, if the person alleged to be insane, or any friend in his behalf, is dissatisfied with the final order of the judge or justice committing him, he may, within ten days thereafter, appeal therefrom to a justice of the supreme court other than the one making the order, who *shall* cause a jury to be summoned and try the question of insanity in the manner as in proceedings for the appointment of a committee. This provision for appeal, it is feared, will be likely to prove a troublesome feature of the new method of commitment, for the reason that it involves a publicity from which the friends of insane persons will naturally shrink, and thus deprive the latter of the benefits which only prompt treatment in a hospital would afford. Besides, it removes the determination of a grave medical question, especially in obscure and difficult cases, from presumably competent physicians and places it in the hands of a jury of laymen. There is one redeeming feature, however, in this provision for appeal from the order of commitment, namely, that before such appeal shall be heard, the person making it shall make a deposit, or give an approved bond for the payment of costs of the appeal, if the order of commitment is sustained. Another feature of the law which it is feared

will tend to delay the taking of steps for the commitment of patients, except in cases of markedly manifest insanity, is that, in case the alleged insane person is determined to be not insane, the court may charge the costs of the proceedings to the person making the application for the order of commitment.

Finally, it must be admitted that the new law as to commitments embodies many desirable and commendable features, as a careful perusal of it will show. It is not impossible that experience in its practical operation will demonstrate that its objectionable features are far less harmful than was anticipated; and if its operation should result in dispelling the groundless belief which now obtains in the public mind respecting the ease and frequency with which sane persons are incarcerated and detained in institutions for the insane, its defects may well be overlooked.

Having thus cursorily outlined the legislation had for the insane in the State of New York since the creation of the Commission in Lunacy in 1889, it is pertinent to inquire into the results of this legislation, both as regards the welfare of the dependent insane and the interests of the taxpayers. In other words, what beneficial results, if any, have been attained in the general care and treatment of the insane, and in the methods of management and condition of the hospitals established and maintained for the care of this unfortunate class of citizens; also, what benefits have the taxpayers derived from the substitution of State for county care of their dependent insane?

Among the more important improvements as regards methods and conditions which have accrued to the institutions for the insane, and their government under the new order of things, may be mentioned the following:

1. A complete registration in the office of the commission of all qualified examiners in lunacy.
2. A complete registration of all persons committed to institutions for the insane, both public and private, with data as to condition, status, results of treatment, etc. This registration already embraces about 35,000 cases of insanity from which intelli-

gent deductions, as well as comparisons in treatment, cost, etc., in the various hospitals may be made. Valuable information is thus made readily available which heretofore could not be obtained from a single source, nor without great difficulty. The collection of this information has been greatly facilitated by the adoption in the institutions of a uniform system of records and statistical returns.

3. Provision for the transfer, by order of the commission, of patients from one institution to another without recommitment. This elastic feature of the State Care Law enables the commission to locate patients in hospitals which are most accessible to their friends; also, to equalize the pressure for accommodations in the State hospital system.

4. Limiting the maximum charge for private patients in State hospitals to ten dollars per week, and providing that no patient shall occupy more than one room, thus securing to the insane "the greatest good to the greatest number," and, at the same time, doing away with class distinctions which were formerly a source of much complaint.

5. A successful effort to induce or compel friends of patients who are legally liable therefor to reimburse the State for the support of such patients. From this source in one year, at a cost of about \$4,000, the commission, through its agents, collected the sum of \$60,000. Formerly many patients who were abundantly able to pay were committed to the hospitals by county officials as public patients, the incentive being political or other influences.

6. The adoption of regulations for the removal of patients from their homes, or from poorhouses to the hospitals, which require that all public patients on delivery to the State shall be in a condition of bodily cleanliness, and clad in new and comfortable clothing throughout. This requirement, the propriety of which will be obvious to experienced minds, has recently been contested by the Charities Commissioners of New York city, on the ground that it was unnecessary and unreasonable. The higher courts decided that it was both proper and reasonable.

7. The removal of patients from their homes or

elsewhere, by trained attendants sent from the hospital, women patients, in all cases, to be accompanied by a woman attendant or nurse. The observance of this rule insures both decency and humanity in bringing patients to the hospitals, besides effecting a large saving in cost as compared with the former method of transfer by county officials. 8. Removal of the legal distinction between acute and chronic insanity by designating each State institution for the insane as "hospital" instead of "asylum" and organizing them all upon a curative basis, thus inculcating the hospital idea. The abolition of this distinction has had a most beneficial effect upon the inmates of those institutions which were formerly set apart for the chronic insane, as well as upon the interest and zeal of their medical officers and nurses, as attested by their superintendents. 9. A regulation regarding the correspondence of the insane, which provides that each patient who desires, may write at least once in two weeks; letters, for any reason, not forwarded to destination must be sent to the office of the commission for examination; letters addressed to officials in the State having jurisdiction in lunacy cases must be forwarded to them unopened. This rule is designed to disarm the criticism that is so often made respecting alleged suppression of patients' correspondence by hospital officials, and at the same time to afford patients who regard themselves as illegally detained or ill-treated, an opportunity to communicate, through proper channels, with the outside world. 10. Provision for paroling patients under certain conditions for a period of thirty days, during which they may be returned to the hospital without recommitment. This affords opportunity for testing the fitness of certain patients for final discharge, and to others for occasional visits at home. 11. A regulation requiring that patients on admission to a hospital shall be immediately informed of the nature of the institution, and the fact that they are detained there under legal commitment. 12. The opportunity which the law affords to all patients of a hearing by the visiting commissioners

apart from any officer of the hospital. 13. A rule restricting the issuing of licenses to conduct private asylums to reputable physicians of experience in the care and treatment of the insane. 14. The general adoption in the hospitals for the insane of a uniform dress for nurses' and attendants' wear. 15. Provision for the clinical teaching of insanity in the State hospitals, by admitting to the wards thereof students of medical colleges situated in their vicinity, as well as of practicing physicians who may desire the opportunity of clinically studying mental diseases, under such restrictions as the superintendents may impose. Under this rule seven medical colleges now avail themselves of the facilities offered by the hospitals for clinical teaching. Also the establishing of a quarterly bulletin, conducted mainly by the superintendents and designed to represent the clinical and pathological work of the State hospitals and of the pathological institute. 16. Provision for the appointment of medical internes in each of the State hospitals in addition to the regular medical staff, thus providing a training school for medical officers from which the regular medical staff may be recruited. 17. A civil service regulation requiring competitive examinations for appointment of resident officers in State hospitals. This provision has resulted in removing all of these positions from partisan influences, and opened the way for promotion, by merit, of experienced assistant physicians and other worthy officers. It is believed that the letter and spirit of civil service requirements are more carefully observed in the State hospitals than in any other department of the State government, and that under its operation the hospitals are as free from partisan influences, both in the matter of appointments and in the tenure of office during efficiency and fitness, as it is possible to have them under a republican form of government. 18. A material increase in the average rates of salaries and wages of all grades of service, also an increase in the proportion of medical officers, nurses and attendants, including a woman physician on the

staff of each hospital. The schedule of salaries and wages recently fixed by the commission provides, in nearly all cases, for promotion in pay at regular intervals independently of favoritism. 19. The gradual introduction of women nurses on the men's wards, such nurses to be paid the same wages as men. 20. A material extension of accommodations for attendants and nurses in detached buildings and the employment of a corps of night nurses, especially in the care of disturbed and filthy patients. 21. The establishment of training schools in all the State hospitals, with a scheme of examinations to be conducted by a committee of superintendents, which shall be alike for all the hospitals. 22. Provision for the employment of dentists for patients whose teeth the medical officers may determine to be in need of attention. 23. Provision for ophthalmological examinations by specialists in that branch of medicine. 24. An allowance of \$100 per annum to each hospital for the purchase of medical books; also, a liberal and varied subscription list to medical journals, magazines and other periodicals for the benefit of the staff and others. 25. An effort to improve the cooking and serving of food, by the employment of a chef in each State hospital in addition to the ordinary corps of cooks, whose duty it shall be to generally oversee the cooking in the various kitchens, and to instruct the subordinate cooks and trained nurses in the preparation of food. 26. The adoption of a schedule of food supplies, including a per diem ration allowance of each article. This schedule is designed to serve as a basis for the hospitals in estimating for such supplies; and also as a guide for the commission in its revision of such estimates. It should be understood that this schedule embraces only staple articles of food such as are in daily use, and does not include fruits of various kinds and many other articles which are regularly allowed in the monthly estimates; neither does it include "special" or "extra" diet for the sick and feeble, which may be prescribed in the discretion of the medical officers. It has been the aim of the com-

mission, within the limit of funds at its command, to encourage the purchase of a better quality of food supplies generally, and to this end, in its conferences with the superintendents, its practice has been to insist upon a higher grade of such supplies whenever the grades called for have seemed to be below standard, especially as regards beef, butter, flour, sugar, tea and coffee, etc. 27. A marked improvement in the methods of bathing, by the introduction in nearly all of the hospitals of "rain" or "spray" baths. 28. A requirement that, so far as the commission may deem it feasible, the hospitals shall enter into joint contracts for the purchase of staple articles of supply, through competitive bids; the contracts to be let to the lowest responsible bidders.

Respecting what has been accomplished in the direction of improvement in the hospitals themselves and for the promotion of the welfare and comfort of their inmates, as a result of the adoption of the policy of State care, a perusal of the annual reports of the hospitals will show that the condition of these institutions as regards organization, equipment, sanitary condition, fire protection, clothing and furniture, food supplies, discipline, nursing, means of diversion and occupation, and medical service has been steadily progressive, and that the standard of care generally is materially higher than it was prior to the enactment of the State Care Law.

The superintendent of the Binghamton State Hospital in his report for 1893, refers to the improved conditions in that hospital under the new system, in the following striking language:

"Analysis of the table showing the causes of death, and comparison with similar tables for preceding years, afford extremely gratifying results. The reduction in the death rate is not only gratifying when computed on the number admitted, but is also highly satisfactory when based on the average daily population, for on this basis, during the past ten years, it has fallen from 11.73 per cent in 1883 to 6.35 per cent in 1893. The question naturally arises, To what

is this remarkable improvement due? To you who have seen the institution grow from a poorly equipped, crudely furnished, poverty-stricken asylum for the chronic insane into the splendid hospital of to-day, supplied with modern sanitary appliances, provided with good food and raiment for its patients, diversified occupation and amusements to engage their hands and minds, and kind nurses to watch over them, the question needs no answer. Improved surroundings, humane care and treatment, freedom from mechanical restraint, and the largest personal liberty consistent with safety, are the agencies through which the change has been accomplished. Up to the year 1890 it was with exceeding difficulty that the bare necessities of life could be procured for our patients, but when in that year the State Care Bill became a law this hospital, scarcely recognized by its sister institutions, was suddenly galvanized into life, and under the beneficent provisions of that act it received a new impetus which enabled it to rise rapidly to high rank in the State. Under the old law anything was good enough for the broken down, chronic cases it sheltered; under the new law the arbitrary distinction between acute and chronic insanity was legally annihilated, and the doors of the hospital were opened to all for whom admission was sought from the eight counties constituting the district assigned as its bailiwick."

In 1893, the legislature enacted a law providing a general appropriation for the support of the State hospitals as provided in the State Care Act, and putting upon the commission the responsibility of supervising the expenditures of the hospitals through a system of itemized monthly estimates to be formulated and revised by it. It was not to be expected that when the State should assume the entire expense of maintaining the hospitals, involving an annual outlay of millions of dollars, it would continue the former method of expenditure by local officials with practically no uniform system and without supervision by some central authority which should be independent of local influences. In other words, when the policy of the State became fixed

in respect to paying the whole cost of maintaining its dependent insane, it became self-evident that the former financial methods could not be adapted to the new conditions and, consequently, that the need of some central supervision and control of the moneys to be expended for that purpose would be imperative.

In entering upon the work of supervising the expenditures of the State hospitals, the commission was deeply impressed with its duty to the dependent insane, on the one hand, and with its responsibility to the taxpayers, on the other. It also realized that it must necessarily encounter difficulties in the beginning, in putting into practical operation a new law which necessitated an entirely new financial system, involving a radical departure from methods which had been sanctioned by long usage and time-honored custom, and under which the funds received by the hospitals from various sources were expended under the supervision and subject only to the audit of local boards of managers.

In the inauguration of the new system it was inevitable that misunderstandings and friction between the commission and the hospitals should arise. The superintendent of the Utica State Hospital, in his report for 1893, pointed out this danger in the following most prophetic language: "The transition from the old order of things to the new will not be accomplished without friction. Soon, however, the machinery must adjust itself to the new requirements. And surely one may safely leave the future to take care of itself, if, in meeting the new problems that will arise, we pause to ask ourselves the simple question whether the end we have in view is the application to our every day work among, and in behalf of, the insane of the humane principle that underlies the State Care Act, and which alone made its passage possible."

It would also be surprising if in the application of a financial system of such vast magnitude and involving such widespread interests, mistakes in minor details should not have been made by the body having the matter in charge.

That such mistakes were made the writer freely admits, but he believes that with the better understanding of things which has come about between the hospital authorities and the commission, now that the new financial system is in successful and practically frictionless operation, no one who is conversant with the situation to-day and with the results attained, would deny that the policy of the commission, as a whole, has been a wise and commendable one. Furthermore, it may be said that the present method of expenditure and accounting, as embodied in the system of itemized monthly estimates, now that it is fully understood, is acceptable to substantially all of the hospital superintendents. In fact, several of the superintendents have assured the writer that they would not desire to return to the former methods if they were permitted to do so. It is not claimed, that the new system is, unlike other human agencies, without imperfections. It is claimed, however, that its already demonstrable advantages over the system which it superseded are so great as to convince even the most skeptical of its former opponents of its superiority in both its humane and its financial aspect.

The following excerpt from the report of the superintendent of the Binghamton State Hospital for 1895, not only reflects the views of a superintendent in respect to the new method, but indicates the status of existing relations between the hospitals and the commission:

"The operation of the hospital under the State Care Law has been highly satisfactory. Difficulties incident to the experimental stage of a new system have disappeared, and the friction which at one time threatened serious complications has entirely subsided. The new financial scheme inaugurated by the State Commission in Lunacy has been found not only practical but much more systematic and convenient than the method previously in use. The great powers vested in the commission under the new law have been wisely exercised and it is pleasing to be able to record that many of the supplies that the hospital has obtained under the estimate system have been

superior in quality to articles of a similar kind previously used. This has been notably so with such articles as beef, butter and sugar. During the entire year we have used none but Chicago dressed beef in carcasses of not less than 600 pounds and of the best quality. Our butter has been made by the separator process and has been purchased directly from the best creameries. The use of brown sugar has been entirely discarded and in its place only white granulated sugar is now used. With our cold storage buildings equipped with refrigerating apparatus enabling us to keep the meat rooms near the freezing point, the butter room at a much lower temperature, and the fruit rooms at any desired degree of cold, we have been able to preserve perishable provisions and to save considerable money by purchasing when prices were low."

The superintendent of the St. Lawrence State Hospital, for the same year, says:

"Our relations with the State Commission in Lunacy during the past year have been harmonious and pleasant. The new system of supervision of accounts has become a matter of no embarrassment and very little friction and seems to work very well."

Anent the same subject the superintendent of the Utica State Hospital in his report for 1895, under the head of "Official Relations," says:

"Relations with the seat of government, through the State Commission in Lunacy, have become more intimate in proportion as successive acts of the Legislature have involved a growing centripetency. It is a pleasure to note a nicer gearing of the parts of this vast and complex piece of machinery and to experience the employment of ball-bearings, as it were, where formerly there was some friction in transmitting motion. Official visitation was had by the Commission in Lunacy on October 13, 1894, and May 18 and 23, 1895, and on my part frequent communication (almost daily by letter and monthly by conference) has been had with the office of the Commission in Albany."

In concluding this subject, it is gratifying to be able to

state that the prevailing opinion among superintendents and the commissioners in lunacy to-day in respect to the monthly conferences between the two bodies at which various questions respecting methods of management are freely discussed—and many of them practically determined by the superintendents themselves—is that these conferences have been productive of great good to the hospitals, as well as to the commission; also that they have finally resulted in the establishment of harmonious relations between the superintendents and the commission, which was “a consummation devoutly to be wished.”

Respecting the benefits derived by the taxpayers from the new methods, it may be stated that the total saving effected by the estimate system in its first year amounted, in round numbers, to \$300,000 over the previous year under the old system. In other words, the per capita cost of maintenance for the fiscal year 1892-3, exclusive of surplus funds expended by the hospitals just before the estimate law went into effect, was \$216.12; whereas, in 1893-4, the first year under the estimate system, the per capita cost dropped to \$184.84, a reduction of \$31.28. Multiplying the daily average number of patients by this last sum makes the difference \$275,453.68, which added to the item of \$25,000 paid by the State for the transportation of patients from their homes to the hospitals—an expense not borne by the hospitals under the former system—makes a total of \$300,453.68. These figures apply only to the eight State hospitals then in existence, the support of the asylums of New York and Kings counties, containing approximately one-half of the dependent insane, not having as yet been assumed by the State.

The new constitution which was adopted by a decisive vote of the people of the State of New York in 1894, and which became the organic law of the State, January 1st, 1895, elevated the Commission in Lunacy to the dignity of a constitutional body, thereby placing it beyond the power of the legislature to terminate its existence, and vested in it exclusive jurisdiction over all institutions for the insane,

both public and private, a jurisdiction which theretofore had been jointly vested in the commission and the State Board of Charities. The adoption of this constitutional provision must be regarded as a final recognition by the people of the necessity of placing the supervision and control of their insane and the institutions established for their care and treatment upon a more substantial and comprehensive basis than had theretofore obtained, while at the same time securing to this class of dependents a more enlightened and humane system of care, as well as greater protection against possible wrong in their commitment and detention, by completely and permanently separating them from other objects of the State's charities, and providing for their supervision by a central authority which shall be independent of local influence and clothed with practically plenary power to remedy defects or abuses whenever and wherever such may be found to exist.

Thus the people of the State of New York, actuated by the conviction that "nations are never impoverished by the munificence of their charities," have finally and unequivocally determined and provided for the control and care of all of its insane who are unable to obtain private care, through a well-devised, permanent and comprehensive system of State supervision and State maintenance—a system which contains within itself the essential elements of self-perpetuation and practically unlimited extension, and which makes it obligatory upon all counties, as well as to their financial interests, to place all of their dependent insane in State hospitals under the absolute control of the State.

THE STIGMATA OF DEGENERATION.

By FREDERICK PETERSON, M. D.,

Consulting Neurologist to Randall's Island Hospital for Idiots; Consulting Physician to the Manhattan State Hospital for the Insane; Chief of Clinic, Nervous Department, Vanderbilt Clinic, College of Physicians and Surgeons, New York; Clinical Professor of Insanity, Woman's Medical College of the New York Infirmary.

The subject of degeneracy in the human race has for some years been exciting much interest and discussion among scientific men. Unusual facilities have been afforded the writer for the study of this condition in connection with work in reformatories, prisons, asylums and institutions for idiots, and he believes that a thorough understanding of the various indices of degeneration would be of value not only to physicians in institutions of the character mentioned, but also to the general practitioner who is frequently brought into contact with degenerates outside of institutions, and commonly at so early a period in life—during childhood or adolescence—that he may often do an untold amount of good by calling attention to an indication of a degenerative proclivity in some member of a family, a discovery occasionally of enormous significance as regards prophylaxis, education and care.

Degeneracy may be defined as a marked deviation from the normal original type or standard. We recognize it as a rule in its effects upon the intellectual life, in the deviations from the intellectual habits and social conduct which we hold in common with our fellows. To the class of degenerates not only belong many criminals, idiots, and insane individuals, but also the great majority of persons whom we call cranks or eccentrics,—the people who live among us a sort of original life, with peculiarities of mental habit and conduct, and whom we characterize as feeble-minded, odd, quaint, queer or singular.

A man of talent or of genius often presents eccentricities of the kind to which we refer, but such deviation from the original normal standard need not be morbid in character;

it may be a deviation toward a higher and better standard recognized by his contemporaries or posterity to be such, and to which we, on our part, try in the end to conform. It might be difficult at times to distinguish between the eccentricities of genius and the eccentricities of degeneracy. There are one or two indications or tests which will aid us in this. One of the indications, in fact the chief test of a normal state is naturally conformity to the social condition in which a man lives. This test applied by itself, however, does not exclude talented individuals and geniuses. Another criterion must be applied to these cases. Is there conjoined with the eccentricity a morbid self-centering of his interests? It is in individuals who concern themselves little with the affairs of the world, but much with personal and selfish matters, that eccentricity of intellectual habit or conduct warrants a grave diagnosis. Now one of the essential characteristics of degeneracy is its inclusion of transmissible elements, so that the degenerate individual not only bears in himself the germs which render him more and more incapable of fulfilling his own functions in human life, but by his hereditary bequests he menaces the intellectual stability of his descendants.

So much for the definition of the term degeneracy. We will now pass on to a consideration of the indications of degeneracy.

STIGMATA OF DEGENERATION.

The indications of degeneracy are known as stigmata-hereditatis or stigmata of degeneration. They may be defined as anatomical or functional deviations from the normal, which in themselves are usually of little importance as regards the existence of an organism, but are characteristic of a marked or latent neuropathic disposition. Much study has of late years been devoted to these indices by many investigators, particularly in their relation to insanity, idiocy, and criminal anthropology, and it behooves all who have to do with the development and care of the human body in any particular,—and this refers espe-

cially to men of the medical and allied professions,—to familiarize themselves with these signs of degeneration in so far as they concern their own special provinces of work. These stigmata are vices of functional and organic evolution. The deviations from the normal may be in the way of excesses or arrest of development. They must be distinguished from the deficiencies or deformities produced by accidents at birth or by disease. I have said that these stigmata are anatomical and functional. But it is more convenient to divide the functional group into physiological and psychic classes. It is the latter which we are more apt to observe in our social relations with degenerate individuals. The psychic stigmata are always characterized by a want of balance or lack of proportion between certain undeveloped or excessively developed faculties and other faculties which are normal. Defect of moral sense, of attention, of memory, will, judgment, or unbalanced excess of musical or mathematical aptitudes may be cited as instances of psychic stigmata. Hence the three following divisions may be made of all of the degenerative indices:

- (1) Anatomical stigmata.
- (2) Physiological stigmata.
- (3) Psychical stigmata.

ANATOMICAL STIGMATA.

Cranial anomalies.

Facial asymmetry.

Deformities of the palate.

Dental anomalies.

Anomalies of the tongue and lips.

Anomalies of the nose.

Anomalies of the eye: Flecks on the iris, strabismus, chromatic asymmetry of the iris, narrow palpebral fissures.

Albinism.

Congenital cataracts.

Microphthalmos.

Pigmentary retinitis.

Muscular insufficiency.

Anomalies of the ear.

Anomalies of the limbs: Polydactyly.

Syndactyly.

Ectrodactyly.

Symelus.

Ectromelus.

Phocomelus.

Excessive length of the arms.

Anomalies of the body in general: Hernias.

Malformation of the
breasts, thorax.

Dwarfishness.

Giantism.

Infantilism.

Feminism.

Masculinism.

Spina bifida.

Anomalies of the genital organs.

Anomalies of the skin: Polysarcia.

Hypertrichosis.

Absence of hair.

Premature grayness.

PHYSIOLOGICAL STIGMATA.

Anomalies of motor function: Retardation of learning
to walk.

Tics.

Tremors.

Epilepsy.

Nystagmus.

Anomalies of sensory function: Deaf-mutism.

Neuralgia.

Migraine.

Hyperæsthesia.

Anæsthesia.

Blindness.

Myopia.

Hypermetropia.

Anomalies of sensory function: Astigmatism.
Daltonism.
Hemeralopia.
Concentric limitation of
the visual field.

Anomalies of speech: Mutism.
Defective speech.
Stammering.
Stuttering.

Anomalies of genito-urinary function: Sexual irritability.
Impotence.
Sterility.
Urinary incontin-
ence.

Anomalies of instinct or appetite: Uncontrollable appe-
tites (food, liquor,
drugs.)
Merycism.

Diminished resistance against external influences and
diseases.

Retardation of puberty.

PSYCHICAL STIGMATA.

Insanity.
Idiocy.
Imbecility.
Feeble-mindedness.
Eccentricity.
Moral delinquency.
Sexual perversion.

Having attempted to classify the various stigmata in
this manner, we may now proceed to a consideration seri-
atim of the anatomical and physiological anomalies above
described:

Cranial Anomalies.—These I have treated of fully in an-
other article to which the reader is referred (*American
Journal of Insanity*, July, 1895).

Briefly they consist of asymmetry of the cranium and of

various deformities, such as microcephalus, hydrocephalus, leptcephalus, scaphocephalus, trigonocephalus, plagiocephalus, and the like.

Facial Asymmetry.—Inequality of the two sides of the face—when congenital and not due to some such disease as hemiatrophy—is to be looked upon as a stigma of degeneration. In the same category may be grouped various irregularities, and such conditions as excessive prognathism or retrognathism. Great prominence, or unequal prominence, of the malar bones is to be observed, and also asymmetry of the orbits.

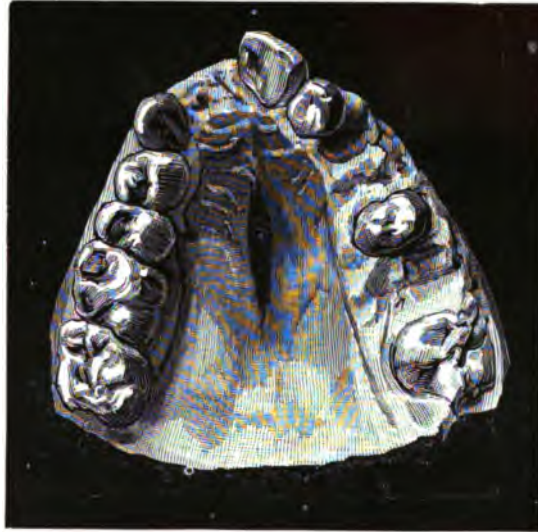
Deformities of the Palate.—In connection with the soft palate, bifurcation of the uvula may be mentioned.* As regards the hard palate, I have dwelt upon its deformities at some length in an article in the *International Dental Journal* (Dec., 1895), and the facts there brought forward may be recapitulated as follows:

While the palate occupies but a small place in this great category of hereditary stigmata of all kinds, it is one of the anatomical group, and this group is for many reasons the one of greatest importance. In this group, too, it occupies a distinctive place as being among the most striking, frequent and significant of the anomalies. I will not say of the palate what Dr. Amadée Joux said of the ear, "show me your ear and I will tell you who you are, whence you came, and where you go;" but I will say, "show me your palate, and I will probably be able to tell whether you belong to the great class tainted by heredity, comprising many insane, imbecile, feeble-minded, criminal, eccentric, epileptic, hysterical, or neurasthenic individuals.

The arch of the hard palate presents considerable variation within strictly normal anatomical limits. A large, wide, moderately high vault is what may be called a normal standard. It means the highest evolution, judging from the fact that the mouth cavity increases in capacity as we ascend the vertebrate series. Deviations from that

* Dana on Deformity and Paralysis of the Uvula—*Am. Jour. of Insanity*, April, 1896.

FIG. 1.



Palate with Gothic arch.

FIG. 2.



Palate with horseshoe arch.

FIG. 3.



The dome-shaped palate.

FIG. 4.



The flat-roofed palate.

FIG. 5.



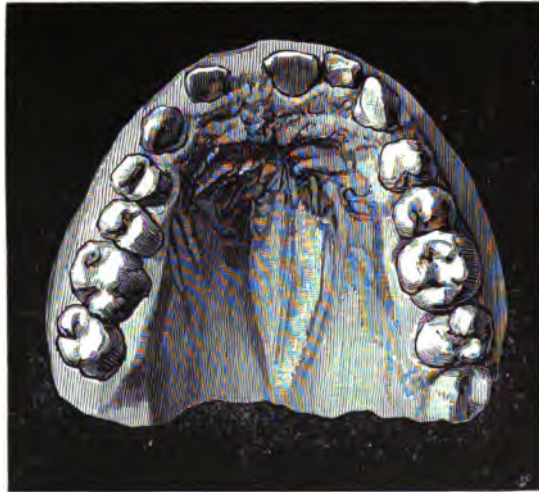
The hip-roofed palate.

FIG. 6.



The asymmetrical palate.

FIG. 7.



Torus Palatinus. (Broad, wide torus.)

standard are not at all infrequent, and yet such deviations may be normal. Thus the palate may be low and broad, or it may be high and narrow; it may be short or long in its antero-posterior diameter. It may be ridged unduly along the palatine sutures, or it may present marked rugosities on its surface, especially in the anterior region; yet these variations are normal. Probably we may look upon these peculiarities as a species of compensatory development. Just as in a study of heads we find some very long and low, and others short and round and high, and recognize the fact that the shortness in one dimension is compensated for by a corresponding increase in another; so we may regard variation in palatine diameters.

The pathological palate has not been studied as much as it deserves to be. Save occasional and casual references to the "Gothic" palate in literature, and one or two papers upon the *torus palatinus*, very little has been written upon the subject. In my paper referred to above, I have attempted to classify such pathological palates as could be justly looked upon as indicative of degeneracy. The word Gothic having been so long in use, and the hard palate being much like an arch or roof,* I have followed architectural nomenclature in the classification offered.

Pathological palates:

- (1) Palate with Gothic arch.
- (2) Palate with horseshoe arch.
- (3) The dome-shaped palate.
- (4) The flat-roofed palate.
- (5) The hip-roofed palate.
- (6) The asymmetrical palate.
- (7) The *torus palatinus*.

The seven varieties named are to be looked upon as types merely. Each type will be found to present variations and combinations with other forms. Thus the Gothic arch may have a low or high pitch and be short or long.

* There is some confusion in literature of the roof of the mouth, or hard palate, referred to in this paper, with the dental arch, which is quite another thing.

The horseshoe arch (a familiar one in Moorish architecture) is always easily distinguished, but, owing to its conformation, a cast can not well be taken of it to show it in perfect outline. The dome-shaped palate may be high or low, may be combined with asymmetry or torus. The presence of a torus in the Gothic variety is apt to destroy the purely Gothic form, and may cause it to resemble the flat-roofed palate. Under the heading of flat-roofed palate I should include all such palates as are nearly horizontal in outline (of which I have not a good specimen to exhibit), as well as those with inclined roof sides but flattened gable. In the hip-roofed palate we have the sloping sides as usual, but also a marked pitch of the palate roof in front and behind; occasionally one may meet with a palate of this kind with so remarkable a pitch from before backward, that it is almost like a Gothic roof turned about so that the gable runs transversely. Asymmetry in the palate is commonly observed in many of the previously described forms, but occasionally is the only noteworthy peculiarity. It is usual to find asymmetry of the face and skull in cases with an asymmetrical palate. The torus palatinus (Latin torus, swelling) was first mentioned by Chassaignac as a medio-palatine exostosis. It is a projecting ridge or swelling along the palatine suture, sometimes in its whole length, sometimes in only a portion of its course. It is always congenital. It varies considerably in its shape and size, so that as many as five or six different species of torus are recognized. It may be wedge-shaped, narrow, broad, very prominent, or irregular. I have said nothing about cleft-palate, for I am not sure that it may be classed among the well marked stigmata of degeneration. I have found but two or three cleft-palates among the four hundred and fifty idiots and imbeciles on Randall's Island, while a number of cases of this kind with which I have come in contact in my professional life were very far from degenerates. However it would seem that there is great need of a faithful study of a large number of cases of cleft-palate, in relation to the question of

degeneracy. The deformed palate is to my mind one of the chief anatomical stigmata of degeneration. It is true that from this single indication, it would not be strictly scientific to adjudge an individual a degenerate. Occasionally perhaps a case presents itself where this anatomical stigma alone would suffice to ensure a diagnosis of this nature, but usually other stigmata co-exist, such as cranial anomalies, deformities of the ear, and the like. The frequency of the pathological palate among marked degenerates, such as the insane, idiots and epileptics, has been testified to by many investigators. Thus Talbot reported 43% of abnormal palates in 1,605 inmates in institutions for the feeble-minded. Ireland makes it nearer 50%. Charon, a later writer than these, found abnormal palates in 10% of apparently normal people, in 82% of idiots and feeble-minded, in 76% of epileptics, in 80% of cases of insanity in general, in 70% of the hysterical insane, and in 35% of cases of general paralysis. Näcke has studied particularly the torus palatinus in 1,449 individuals, normal and psychopathic; he found it present in 23.9% of psychopathic women (insane, epileptic, idiot, and criminal), 32.9% of epileptic women, 34.4% of criminal women, 22.7% of normal women.

The percentages were smaller in men than in women. A narrow torus is more common than a broad one.

Stieda examined 1,500 skulls for the torus from an anthropological point of view. The skulls were of Prussians, Armenians, Africans, Frenchmen, Russians, and Asiatics. He decided that it has no anthropological significance, gives no racial distinction. While the torus is undoubtedly of value as an index of degeneration, particularly where it is well marked, it probably has less importance in this respect than some of the other forms of pathological palate.

Dental Anomalies.—Among anomalies of the teeth are macrodontism, microdontism, projecting teeth, badly placed or misplaced teeth, double row of teeth, or teeth which are striated transversely or longitudinally. Caries of the teeth and Hutchinson's teeth are due to neglect or disease. The

latter, however, may often be considered as a stigma of degeneration. Then there is a retardation of the first and second dentition.

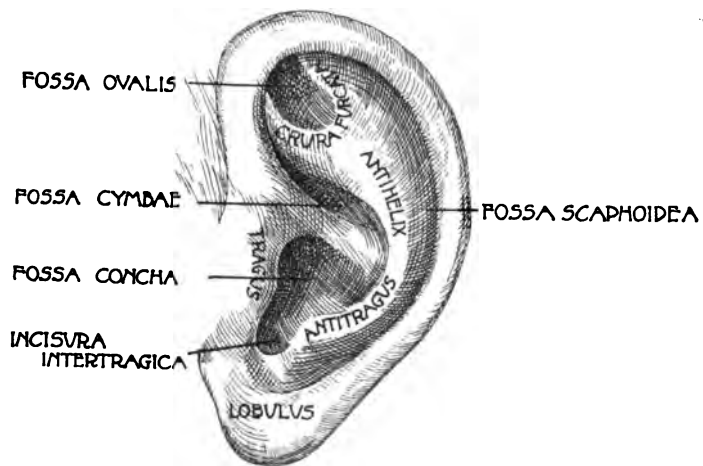
Anomalies of the Tongue and Lips.—A very large tongue (macroglossus) is not infrequently observed among the lowest classes of degenerates, as in idiocy. Sometimes there is microglossus, asymmetry of the two halves, or bifidity of the point. Hare-lip is somewhat more common than cleft-palate, but, like the latter, its exact standing as a degenerative stigma is not fully determined. Undue swelling or puffiness of the lips is noteworthy.

Anomalies of the Nose.—Marked deviation of the nose to one side or the other should be noted. Taken alone it may possess little significance, but in conjunction with other stigmata, it has value. The nose may be absent, or present defect of osseous development (nasus aduncus), or atresia of the nasal fossae.

Anomalies of the Eye.—The pathological conditions of the eye have been placed in two groups in the above classification, since some are anatomical and some physiological. To enumerate them altogether, they are as follows:

ANATOMICAL.	PHYSIOLOGICAL.
Flecks on the iris.	Blindness.
Strabismus.	Myopia.
Chromatic asymmetry of the iris.	Hypermetropia.
Narrow palpebral fissures.	Astigmatism.
Albinism.	Daltonism.
Congenital cataracts.	Hemeralopia.
Pigmentary retinitis.	Concentric limitation of the visual field.
Muscular insufficiency.	Nystagmus.
Microphthalmos.	

It is true that any one or two or more of these conditions present do not certainly indicate degeneracy, but they are significant in connection with other abnormal states, and all of them are more frequently observed in degenerate individuals, especially the lower orders, than in normal



NORMAL EAR



No crus superius; no anthelix; small fossa conchæ; few details of ear.



No lobule; almost no fossa concha; shallow fossa scaphoidea; fusion of helix, anthelix and antitragus. A type of Stahl ear No. 3.



Darwin ear in an epileptic.



Prominent anthelix; mal developed helix; absence of lobule; diminution of the concha. Wildermuth ear No. 1.



Broad band-like helix ; no anthelix ; no lobule ; excessive size of fossa cymbæ.



Excessive length of ear ; fusion and distortion of helix, anthelix, antitragus and lobule.



Stahl ear No. 1.
Elephant ear.



Fissure in anthelix ; slight Darwin tubercle ; slight antitragus.



Triplication of crura furcata ; mal-formed helix and antitragus ; absent lobule.



Excessive length of ears; facial asymmetry.



Blainville ears, and also excessive length of ears.



Abnormal implantation of ears; too marked conchoidal shape.
The Morel ear.

persons. In idiots, convergent strabismus, due to defect of refraction and in conjunction with hypermetropia, is very common. Muscular insufficiency and nystagmus (lateral or rotatory) are also often met with in this class of cases. In paralytic and other idiots and imbeciles homonymous hemianopsia is sometimes met with.

Anomalies of the Ear.—Deformities of the ear have been deservedly well studied, for as stigmata of degeneration they take high rank, like anomalies of the hard palate, in the anatomical group. Morel, Stahl, Wildermuth, Binder and more recently Schwalbe, have given us especially good studies of these conditions. From their writings and my own studies, the following classification (following Binder) into twenty-two varieties may be made:

I. Abnormally implanted ears; they project too far or lie too closely, are placed too high or too low, too far forward or too far backward on the head.

II. Excessively large ears; (1), absolutely too large; (2), relatively too large in small or microcephalic individuals.

III. Ears which are too small.

IV. Too marked conchoidal shape of the ear. The details of the ear (anthelix and crura, etc.) are but slightly marked, while the helix outlines the ear like the rim of a funnel.

V. Ears which have a general ugly shape. The breadth of the upper part may exceed that of the lower and vice versa; excessive length; ears without lobules; unusually short ears.

VI. The ear not uniform in width; usually a long ear with one or more constrictions in its breadth.

VII. The Blainville ear; asymmetry of various kinds of the two ears. In most cases the asymmetry is due to an anomaly of the left ear.

VIII. The ear without lobule; there are usually other deformities of this ear besides the absence of lobule, such as too large a concha, prominence of the anthelix, etc.

IX. The ear with adherent lobule; the lobule is enlarged, adherent and inclines downward towards the cheek.

X. The Stahl ear No. 1 (See *Zeitschrift für Psych.*, Vol. xvi). A series of anomalies of the helix. The helix is broad like a band and coalesces with the cartilages of the crura furcata. The fossa ovalis and fossa scaphoidea are scarcely to be seen. The lower half of the helix is obliterated. There are occasionally slight variations from this type.

XI. The Darwin ear; helix interrupted where its transverse portion passes into the descending, and at this point is a projection of the rim above and outward, like the pointed ear of lower animals.

XII. The Wildermuth ear (Würt. Corresp. Blatt, 1886, No. 40). The anthelix projects so far as to form the most prominent part of the auricle.

XIII. The ear without anthelix or crura furcata.

XIV. The Stahl ear No. 2. Multiplication of the divisions of the crura furcata, so that there are three instead of two crura.

XV. Wildermuth's Aztec ear. Lobule wanting; the whole ear seems pushed forward and downward; the crus superius of the anthelix coalesces with the helix, while its crus anterius is scarcely perceptible.

XVI. The Stahl ear No. 3. Only the crus anterius of the crura furcata is present, while the auricle seems divided into two halves by a ridge from the antitragus.

XVII. The ear with double helix.

XVIII. The ear with too large or too small a concha.

XIX. The ear with continuous fossa scaphoidea. The fossa passes down into the lobe.

XX. The Morel ear. A form marked by abnormal development of the helix, anthelix, fossa scaphoidea and crura furcata, so that the folds of the ear seem obliterated, and the ear is smooth, larger than usual, often prominent and with thin edge.

XXI. Ears misshapen by abnormal cartilage development. Here belong all irregular cartilaginous growths and thickenings except those caused by hæmatoma of the ear.

XXII. Various peculiarities, difficult to classify, are included here, such as abnormalities of the semilunar incisure of the tragus and of the meatus, colaboma of the lobule, hairiness of the different parts of the auricle, accessory ears, clefts, etc.

The most important malformations of the ear, those that may be regarded as belonging to the stigmata of degeneration, and those too which are striking and plain to the eye, are to be summarized as follows:

- The deep position of the crus anterior.
- Marked prominence of the anthelix.
- Excessive broadening of the ear.
- Stunted development of or absence of the helix.
- Trifurcation of the anthelix.
- Widening of the fossa scaphoidea.
- Absence of the crus superius.
- Complete absence of lobule.
- Asymmetry of the two ears.
- Excessive enlargement or diminution of the concha.
- Excessive conchoidal structure of the ear.

Reference is occasionally made in literature to the Cagot ear. The Cagot is a species of cretin in the French and Spanish Pyrenees, in which one of the chief physical deformities is absence of the lobule of the ear.

Binder states that the adherent lobule exists in almost one-third of normal people, and in the photographs of several hundred distinguished people, 15% had abnormal lobules. At the same time more than twice as many adherent lobules are found in degenerates as in normal people.

Now with regard to the statistics of mal-formed ears in degenerate individuals, Wildermuth noted this condition in 41% of 142 idiots. Binder found 64% of degenerate ears in 354 insane persons. It is to be remarked, however, that Binder was more careful in his examinations, and by long practice had acquired more expert knowledge than Wilder-

muth. Fraenkel observed degenerate ears in 29 cases out of 32 with cranium proganæum.

Knecht found 20% of degenerate ears among 1,274 criminals, 27% among 48 epileptics, and 32% among 84 insane.

Binder noted degenerate ears in 33 persons outside of institutions, supposed to be normal individuals. Inquiring closely into their histories he discovered that 7 of them had insane parents, brethren or children, in 19 there were decided psychic abnormalities, and only 7 were apparently normal people. As regards heredity, it is very common for children to inherit ears with the identical characteristics of those of one or the other parent, but on the other hand, it is not uncommon for the ears of the children to be quite different.

Anomalies of the Limbs.—Paralysis, atrophy, retarded growth, club foot, and athetosis are conditions due to disease of the brain, and are observed in many cases of paralytic idiocy. These are not properly stigmata of degeneration, although they may be such under some circumstances, as for instance when club foot or club hand has a teratological origin. On the other hand there are anomalies having a hereditary character which are essentially degenerative indices. Among these may be mentioned congenital luxations, supernumerary fingers or toes (polydactyly), fusion of fingers or toes (syndactyly or aschistodactyly), excessive length of the arms as compared with the rest of the body and the lower limbs, missing fingers or toes (ectrodactyly), missing limb (ectromelus), fusion of the extremities (symelus or symmeles), or absence of parts of limbs so that they are excessively short (phocomelus). There may also be anomalous brevity of some digits as compared with the relative proportions of normal digits. Excessive volume of limbs (megalomelus) or of digits (megalodactyly) or excessive gracility of limbs (oligomelus) or of digits (oligodactyly) also deserves mention.

Anomalies of the Body in General.—Local malformations are naturally of more importance than general anomalies of the whole form, but it is necessary to study the relative pro-



Phocomelus of right arm in an epileptic girl. Right humerus several inches shorter than left. Movements of arms perfect on both sides.

portions of the entire figure from an anthropometrical point of view and to compare the results with normal standards. Excessive diminutiveness of figure as well as excessive or giant growth are indications of degeneracy. So too are infantile characteristics in an adult, feminine peculiarities in males and masculine traits in females. In this regard observations of the relative proportions of the shoulders and pelvis are particularly useful. The occult form of spina bifida with local hypertrichosis is met with. Deviation of the vertebral column among neuropaths is mentioned by Féré. They may be lordoses, scolioses, or kyphoses in various degrees. The coccyx may present peculiarities, such as simulation of a tail. Thoracic asymmetry or other deformity is observed at times. Absence of pectoral muscles or of muscles in various parts of the body have significance. Hernias are evidence sometimes of arrest of development of some part of the abdominal wall. Excessive development of mammary glands in males, or their absence or reduplication (polymastia) in either sex constitutes an evidence of degeneracy.

Anomalies of the Genital Organs.—Among the genital anomalies in males are cryptorchismus; unilateral or bilateral microrchidia; spurious hemaphroditism; insufficient development of the entire genital apparatus; hypospadias; epispadias; defect, torsion or great volume of the prepuce; median fissure of the scrotum; imperforate meatus.

In females the labia may be abnormally large, simulating a scrotum, sometimes very small. The clitoris may be exceedingly large. The labia minora may be hypertrophied. Sometimes there are intermediate folds between the labia minora and labia majora. The labia minora may be pigmented, particularly in brunettes and when they are hypertrophic. There may be imperforate vulva, or atresia of the vagina, or double vagina; uterus bicornis is sometimes met with.

Anomalies of the genito-urinary apparatus should always be sought for, for though most frequent among idiots, imbeciles, epileptics and the like, they are by no means rare

in other classes of degenerates and in degenerate families. In males defect of the testicles often coincides with general excess of growth in the whole body or in the lower extremities, such as is often produced by castration in man and lower animals.

Anomalies of the Skin.—Among the anomalies of the skin are to be mentioned adipose thickening; polysarcia; precocious and often abnormal development of the hairy system; hair along the spinal column; rudimentary tail; premature grayness; a glabrous chin in grown men; persistent lanuginous character of the hair; excessive growth of hair on the chin and breast in women; complete or partial decoloration of the hair (albinism, vitiligo); local or general hypertrichosis; partial or complete absence, or foetal state of the nails; melanism of the skin; pigmentary or vascular naevi; molluscum; ichthyosis; vitiligo; albinism; pigmented spots.

Anomalies of Motor Function.—Delay in acquiring a knowledge of the proper use of muscles for walking, eating and the like may often be justly regarded as an index of degeneracy. Where ordinary etiological factors may be excluded, tremors, tics, epilepsy and nystagmus have a similar value. Even when not congenital they often indicate hereditary instability of the nervous system.

Anomalies of Sensory Function.—The numerous anomalies of function in connection with the eye have already been mentioned. Congenital deafness has also its significance. So too have hereditary forms of migraine and neuralgia. Certain defects or excesses in general cutaneous sensibility have been noted as frequent among degenerates. A general anaesthesia is not uncommon especially among lower classes of degenerates. In some instances there is hyperaesthesia.

Anomalies of Speech.—It may be questionable as to how far stammering and stuttering are to be looked upon as functional degenerative stigmata, but they are certainly found more often in children with a neuropathic inheritance



Female imbecile, aged 30 years, with hypertrichosis.



Male epileptic, aged 40 years, with glabrous face and chin and facial asymmetry.

than in children with good heredity. Delay in the acquisition of language, or complete or partial defect of speech, have more significance. •

Anomalies of Genito-urinary Function.—Sexual irritability, impotence, sterility, and urinary incontinence must be considered as indices of neuropathic disposition. Retardation of puberty in both sexes, but especially in the male sex, is a noteworthy indication.

Anomalies of Instinct or Appetite.—It has been pointed out that among all degenerates there is a taste or appetite for certain foods or drugs which tends to favor their dissolution (alcohol, morphine, cocaine and the like). In many cases of inebriety the uncontrollable appetite is to be looked upon as a functional stigma of neuropathic inheritance. Gluttony, merycism and the like are usually similar indications.

Miscellaneous.—A diminished resistance against external influences (such as strains of various kinds) and diseases is significant. Great precocity of intellectual development and of certain aptitudes, and morbid emotional conditions are among suspicious indications of a neuropathic basis.

The psychical stigmata of degeneracy need only the enumeration given above.

THE ETIOLOGY OF HEREDITARY STIGMATA.

A few words should be said concerning the etiology of the stigmata of degeneration. When we come to investigate the causes which lead to their formation we meet with much difficulty. Usually we must look to modifications occurring during foetal development, during the evolution of the child, modifications brought about by arrests or errors of development, not so much perhaps in the organs themselves (which show the effects) as in the central nervous system, in the nervous mechanism which governs heredity. As the evolution of our bodies as well as our minds depends upon the brain and spinal cord and the countless nerve filaments which radiate from them to every tissue, so the nervous system plays the most important part in the influences which have to do with

heredity. The nervous co-ordinations must be re-arranged by strong stimuli in order to reproduce the hereditary impulse. This is why traits acquired by us in our individual life-time are not apt to be inherited by our descendants. If a person loses an arm, his children are not deprived of that useful member, for the nervous mechanism of development which has for ages produced arms in their proper places and which is fixed in the powerful hereditary impulse of the race has not been changed. So in the breed of dogs whose tails have been cut off for countless generations, not one is born without a tail, because the nervous co-ordinations governing the evolution of the tail bear down with all the hereditary force of the race since its first beginning (when the tail existed though the animal was legless) to keep it in existence. If in some way we could reach the nervous mechanism which is responsible for the evolution of the tail, we might modify or even prevent its development. It is therefore some derangement of the nervous mechanism governing heredity which brings about deviations from the normal type, which gives rise to anatomical, physiological and psychic anomalies which we designate as the stigmata of degeneration. How is the nervous mechanism of heredity deranged? It may be readily and profoundly deranged in a variety of ways, for instance by poisons. Thus alcohol disarranges the nervous mechanism of heredity in such a way that the descendants may suffer from the drink-craving, from idiocy, insanity, epilepsy, hysteria, neurasthenia, from shattered nervous systems, for at least three generations, and in these unfortunates we find along with marked functional stigmata of degeneration, these actual physical deviations from the normal type which we call anatomical stigmata. But idiocy, insanity, epilepsy and the like are in themselves conditions which disarrange the nervous co-ordinations so profoundly as to affect the hereditary impulse and give rise to anatomical and functional stigmata in the descendants. What is bequeathed to the degenerate child is a fragile and unstable nervous constitution. The evidence of this in-

herited fragility of the nerve-mechanism may present itself as insanity, or it may be epilepsy, or it may be feeble-mindedness, or it may be criminal tendencies, or it may be simple nervousness or hysteria or certain kinds of headache or possibly only eccentricity. All of these disorders are more or less interchangeable and are merely proofs of an unstable nervous organization. Where such conditions do not develop they may still exist in a latent state and pass as a legacy to another generation. Whether the neuropathic state be manifest or latent, we are apt to find anatomical stigmata of degeneration present on careful examination.

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THE USE OF STATIC ELECTRICITY IN THE TREATMENT OF INSANITY.

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The abandonment of Franklinic for the galvanic and Faradic forms of electricity is not well sustained. If electrolysis is the *sine quâ non*, it may certainly be maintained that in the primary current we have an agent that is more reliable, but this is only one of a number of the therapeutical functions of an electrical current. Frictional electricity has, on the other hand, some marked advantages over the primary current, that particularly adapt it for use in the insane. It is not as much the chemical change of tissue that is sought, as the stimulation of the circulatory apparatus, thus indirectly affecting nutrition. This can be obtained in a general way, and as effectually by Franklinization, as by galvanism, and with a greater certainty of result. For local application, perhaps, this does not apply. Its ease of administration, the pleasant and soothing effect of the frictional current, makes it also the least objectionable of the several forms for application. It has, moreover, a decided advantage as a moral agent for treatment, and the psychic effect of its application cannot be compared with the other forms. Its use may be attended with dramatic skill that will stir up the slumbering senses to a realization of objective things. Nothing can divert a subjective mental state more effectually than an eighth-inch spark; and when this dramatic exhibition is subjected to controlling influences, that permit its application without pain or discomfort, there is an exhibition of power of mind over matter, that leads the patient to a trustful hope for improvement, and a faith in results, that in itself is a curative element. The observation of the application of static electricity, by the electric bath, static breeze, or local sparks, leads me to the belief that the current has a distinct effect on the vaso-motor apparatus, and acts as a stimulant to the

circulation and to nutrition. The cases reported were treated alone by static electricity. In several instances improvement began with its use, and continued progressively, without interruption, during its use. Observations were taken before and after treatment, and the "good feeling" resulting from the *séance*, became extended as treatment was prolonged.

The instrument used was a Wimhurst-Holz machine, as modified by Morton. It has an electric motor attached, and its application was never interrupted by the failure of the machine to work in any kind of weather. A dry atmosphere was maintained in the air-tight case enclosing the elements, by the use of caustic lime, and this was effective in all kinds of weather, and in all seasons.

The ordinary form of application was the static bath and the breeze; seldom using the sparks, except when some local effect was desired. The first manifest result is a quickening of the pulse rate, a flushing of the surface, and a stimulation of the excretory function of the skin. Sweating is sometimes extreme. The expression of "good feeling" after a *séance* is almost invariable. The period, as before stated, is prolonged with treatment. The happy results of treatment are not immediate. An improvement in nutrition, a brightening of the mental faculties, an improvement in the appetite, increase in weight, regularity of sleep, are the earliest symptoms of improvement. It is seldom that delusions are attached to this form of treatment, and oftener delusions are dispersed. The mystic power that is manifested, is overcome by its harmless nature, and by the absolute control of the operator. In cases of melancholia, the patient frequently brightens up, and takes a notice of his environment after its use. In neurasthenia, there is frequently a dispersion of the aches and pains, and a relief from other forms of discomfort.

In several cases, in which but little hope of recovery was held, recovery ensued after prolonged treatment by static electricity alone. In one case of neuritis the patient's delu-

sions were confirmed by attempting to walk suddenly after a *stance*, but this case was an unusual one.

CASE No. 2270.—Male, aged 46, married, physically strong and robust. Has had epileptic convulsions since 14 years of age. Later has been depressed—simple melancholia. His convulsions occur fortnightly with considerable regularity. Do not seem to be controlled by bromides, or ordinary medicinal treatment. Commenced static electricity by daily *stances*, of a static bath for 5 minutes, and a Faradic application to the crown for 10 minutes. Had but one convulsion in six weeks, and became cheerful and hopeful, inclined to industry. In the following four weeks had but one convulsion with a continued mental improvement. He is still progressively improving, and he ascribes his bettered condition wholly to his electrical treatment.

CASE No. 2183.—Male, aged 38, married, farmer, moderate habits, inheritance neurotic and phthisical. Admitted 27 January, 1895, suffering from acute melancholia of four months' duration. Alleged causes heredity, and use of cocaine as a local anæsthetic. Insomnia, depressed circulation and acute apprehension the leading symptoms. Emaciation was marked. Remedies applied to nutrition with success, but continues depressed. Six months after admission he arrived at a condition of fair nutrition with mild depression but he did not respond to the application of further remedies, and gave promise of becoming a chronic case of melancholia. Physical exercise, gymnastics, massage, and hydro-therapeutics were faithfully tried. 15 February, 1896, commenced static electricity, by the static bath and crown breeze, and improvement was immediate and progressive until 16 May, 1896, when he was discharged recovered. In this case the frictional current was the stimulant *par excellence*, and apparently could not have been substituted. Without it, in all probability there would have been the usual history of melancholia lapsing into chronic depression. During his electrical treatment he gained 22 pounds in weight.

CASE No. 2421.—Male, aged 27, married, laborer, habits temperate, suicidal, great-grandfather insane, otherwise good antecedents, alleged causes masturbation, predisposing cause neurasthenia. Admitted 28 March, 1896, in a very depressed condition. Duration two years, and insanity supposed to be chronic. No intermission. Gives some evidence of dementia. Untidy and talks to himself. On 14 April, 1896, commenced frictional spray, 10 minute *stance*. Had an acceleration of pulse rate from 6 to 10, with an increase in reflexes, which were markedly exaggerated before and after. Until 30 April, 1896, no perceptible improvement. Following that date, improvement began and continued, until the present writing, when he appears fairly well. Has recovered his cheerfulness, and a marked improvement in all physical

symptoms. First improvement noticed was in circulation and nutrition. The only addition to the treatment of static electricity, is well-regulated out-door exercise, which had previously been tried without avail

CASE No. 2163.—Male, aged 43, single, laborer, admitted 14 June, 1895, in a condition of acute mania, the result of prolonged intemperance. 15 August, 1895, he had become quiet, but had reached a stationary condition, when daily *séances* of static electricity were applied, with immediate improvement. The physical effects were an increase of temperature from 1 to $1\frac{1}{2}$ degrees; an increase of pulse rate, and a free action of skin. "Patient very apprehensive, but offered no resistance. Could not get him to talk or say whether it hurt him or not." 17 July, 1895, "Still apprehensive, upon sitting in the chair, but in a few moments becomes talkative and asks if he was sitting all right. Said it made him feel dizzy at first, but he felt that it did him good. None of the attendants or physicians had seen him as talkative." 24 July, 1895, "Patient still improves and is anxious to do some work on the farm. Asks several times during the *séance* if he is sitting all right. Patient says he feels better and this is verified by the attendants." 8 August, 1895, "Improvement marked. Complains that the static bath makes him feel dizzy."

Improvement continued to recovery.

CASE No. 1915.—Male, aged 51, single, diagnosis chronic melancholia of one year's duration. Maternal heredity and tendencies suicidal. Without improvement, static electricity was applied by bath, in a 10 minute *séance* daily 16 July, 1895, and continued to 15 September, 1895. 18 July, 1895, "During the first five minutes of application, patient's hands trembled very noticeably but during the latter part of application became steady." 30 July, 1895, "Extremities were cold before the *séance*." 9 August, 1895, "Improving, does not require to be urged. This evening started a conversation for the first time since admission."

CASE No. 2231.—Male, aged 49, married, lawyer, admitted 16 August, 1895, for sub-acute mania, two years' duration. Commenced static bath at once, and continued it, alternating with crown breeze until 2 September, 1895. 24 August, 1895, "Patient very rational and asserts this course of treatment is doing him good. Has been feeling nervous and tired, and has gone out feeling much better. His appearance improved." Discharged recovered 12 January, 1896.

It may be granted that the field for frictional electricity is limited, but it certainly has as precise a need in certain conditions of the nervous system as other stimuli. It has

become with us, a routine practice in convalescence to aid the non-resistant psychic and neural economy with this tonic, and it is now considered an indispensable article of the armamentarium. We feel that in many instances it could not be substituted. There is also a class of cases that reach a stage of inertia that do not respond to any effort to change their condition, that do seem to respond to frictional electricity. However few these cases may be, they require this means of treatment before they are permitted to join the great army of incurables.

PROPHYLAXIS IN THE PUERPERAL INSANE.
PUERPERAL SEPTICÆMIA. ILLUSTRATED
BY ONE CASE.

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The management of the puerperal insane embraces a double responsibility for not alone does it demand the most rigid adherence to the principles of antiseptic midwifery, but additionally carries with it the responsible supervision of the patient's mental state, which is so apt to fluctuate at the critical moment.

A public institution of this kind is compelled to receive into its ranks representatives of the lowest type of civilized life mostly composed of the poorest foreign element of New York City, reared in filth and vice, who, should they once be deprived of mental control, instantly yield to the predominating coarser and brutal instincts normally under the influence of individual volition. Entering as such cases do at times, in a state of deep moral depravity and advanced physical decay, they are entitled to the most profound sympathy and kindest attention. Fiercely opposed to asylum régime at first, they may in the course of time realize the

necessity of moral discipline and accommodate themselves accordingly, not infrequently expressing considerable surprise at the humane treatment they receive and the total absence of mechanical restraint, conditions so much at variance with their former ideas.

Owing to the recent advances in bacterial pathology we are no longer compelled to work in the dark relative to the etiology of this disease; it is however still *sub jussu* whether or not the theory of autogenetic infection is tenable, as, in the majority of cases, the origin of puerperal fever can be traced to external causes. According to Bumm, whose untiring energy in this direction has greatly advanced and enlarged our knowledge, the poison, with rare exceptions, gains entrance to the organism from without; adherence to the self-infection doctrine in his estimation only too frequently serves to screen the attending accoucheur. Before arriving at a definite diagnosis we must exclude all those factors capable of generating pyrexia in the parous state, such as: marked mental excitement, pronounced hysterical manifestations, minor reflex disturbances, gastro-enteric troubles, notably constipation and any pre-existing febrile disorder, all of which might lead us to infer that actual infection had taken place.

Pathologically we recognize two distinct varieties; clinically they are more or less associated. The etiological factors are demonstrable bacterial poisons, which find a fruitful soil in the recently bruised genital tract, especially the os uteri—the most frequent site of early infections resulting from repeated digital examination conducted without sufficient care. One type, milder in its clinical manifestations, is due to the presence of putrefying organic matter within the uterine cavity, the noxious products of which subsequently enter the circulation inducing a state of toxæmia known as *sapræmia*. The blood as a rule is free from germs, but in severe cases the bacilli do enter, when the leucocytes attempt to free the system, should the vitality be sufficiently high, by the well known process of phagocytosis. The clinical picture of the other type

presents far more serious phenomena; it constitutes the true septicæmia, the immediate result of a streptococcus invasion. Through the disintegration of a septic uterine thrombus they are swept into the circulation, profoundly shocking the nervous system, and lead eventually to the formation of metastases in distant organs—a septicopyæmia. These streptococci are morphologically and biologically identical with the causative element of erysipelas and phlegmonous inflammation. They are said to attack and perforate the red blood corpuscles and paralyze their energy for carrying oxygen, leading to death from apnœa, if the infection is sufficiently severe. One such case was under observation at the Bellevue Hospital.

Prophylaxis, therefore, is of the utmost importance when dealing with the pregnant insane, not alone because they often retain dirty and filthy habits, but also from their great susceptibility to septic infection. They must be removed from all contaminating influences and strict asepsis enforced. Douching early in pregnancy is not in favor; later on, however, when isolated uterine contractions and sacral pains predict the speedy onset of labor, a vaginal douche of 1:3000 corrosive sublimate or 1.40 carbolic acid is administered and a loose tampon of iodoform gauze placed into vagina for two days, which serves the twofold purpose of reducing the chances of infection and stimulating the cervix to more rapid dilatation, so tedious in some cases. The exhibition of a brisk cathartic five or six hours before the expected onset of labor is of service as will be noticed below; calomel in the form of the tablet triturate, followed by a saline laxative, will be found most successful. Digital examination, the most common source of infection, is deferred till after the rupture of the membranes, when a fresh plug of gauze is inserted; the position of the fœtus is ascertained as far as possible by abdominal palpation. The condition of the bladder must receive full attention as the visceral responses and reflexes are abnormally lowered in most of these patients and the urine retained. If only voided in small quantities, it may

result from an overflow and catheterization must be resorted to before the advancing head has fully engaged pressing the neck of the bladder forward against symphysis, which renders the introduction of a catheter very difficult. Should the patient prove troublesome and disturbing, trional in twenty grain doses every two or three hours, for two or three doses will act as an excellent sedative without impairing the mechanism; on the contrary by overcoming the nervous irritability it saves the patient's strength and good uterine contractions follow. Whisky in half ounce doses at short intervals has yielded satisfactory results in subduing moderate excitement and hysterical demonstrations in weak and chlorotic individuals. Faulty presentations or violent mental explosions render narcosis indispensable, yet cases have occurred where, owing to deep stupor, absolute insensibility to pain existed and versions were accomplished without employment of a sedative. The insane are very susceptible to the influence of chloroform or other anæsthetics and react with difficulty, but possess a remarkable tolerance for morphine and hyoscyamine. One-third to one-half grain of the former combined with one-fortieth grain of the latter as subcutaneous injection has induced sufficient narcosis for minor surgical and three protracted high forceps operations, which were carried to a successful issue, the patients rallying nicely. In some cases spraying the vagina with cocaine as the head advances toward the perineum effectually benumbs the mucous membrane and aids in the birth of the head. After delivery a vaginal douche of 1:3000 corrosive sublimate is administered, while uterus is supported from without to prevent the fluid from escaping upward. A piece of iodoform gauze is then packed into vagina and the ordinary vulvar pad applied with binder. Intra-uterine irrigation is only employed after operative interference, birth of a dead foetus or curettement. The douche nozzle consists of a slightly curved stout glass tube of rather large calibre through which the stream is directed against the anterior uterine wall at a low pressure. Following a

high douche a narrow strip of iodoform gauze is inserted into uterine cavity, allowing the lower end to project one inch, against which a piece of gauze is placed to discourage any capillary action from without. The gauze acts as a powerful uterine stimulant and appears less dangerous than the hard cervical drainage tube, which will, unless properly adjusted and retained, allow entrance of air and retard the outflow of secreta. After twelve to eighteen hours the packing is renewed with due antisepsis, and vaginal gauze replaced. Vaginal douches are administered every other day during the first week of the puerperium and then discontinued, if the case progresses favorably. Should, however, in spite of these precautions a moderate rise of temperature present itself soon after confinement, the cause must be sought for at once, the dressings removed and inspected and the odor of the lochia observed. If the uterus is flaccid and contains blood clots, the lochia abundant and foul or even suppressed, early curettement without anæsthetic should be performed, which usually brings away small pieces of placental tissue and shreds of membranes in various stages of decomposition. On the other hand, if the constitutional symptoms are mild and do not augment in force and a careful examination of the genital tract reveals total absence of contaminating influences, the causal element is likely to be found in the intestinal tract—a fermentative putrefaction of common occurrence in the insane—the products of which absorbed into the blood call forth a toxæmia similar to that originating in the uterine cavity. Thorough catharsis will generally remove away the cause and the pyrexia disappears.

The following case entering with septic poisoning will be found interesting, as it presents an unusual amount of tolerance towards a germ invasion during an attack of frenzied melancholia:

M. K., Italian, thirty-six years of age, married, Ipara. No hereditary predisposition. Previous history: Appeared to be in fair health till early in December, 1895, when her restlessness and increasing

depression denoted the approach of mental derangement, which eventually terminated in profound melancholia interrupted by attacks of paroxysmal violence increasing both in frequency and intensity as the case advanced. She displayed strong suicidal impulses and on two occasions attempted to cut her throat. She then threw herself down a flight of stairs flat on her abdomen, which she afterwards beat violently with her hands. Three weeks later she bit the tips off some lucifer matches, which were, however, removed before she could swallow them. At this period she was totally unmanageable and was committed to the asylum on January 31st, 1896.

On admission patient appeared intensely depressed and in deep despair; refused to speak, but moaned and groaned incessantly. Thermometer registered 102.2° F.; pulse rate 130 per minute, full and of rather high tension. Respirations were shallow but not accelerated. Physical examination: Heart and lungs seem free from organic lesions. Abdominal palpation reveals a soft, doughy mass uniformly enlarged and yielding to the touch suggestive of eighth month of utero-gestation. Uterus appeared to be out of proportion to the size of the foetus and the limited amount of amniotic fluid. Foetus was freely movable and ballottement distinct. Tapping the uterus with hands elicits marked succession sounds indicative of air and fluid within the uterine cavity. Active foetal movements wanting. Deep percussion note over uterus tympanitic. Auscultation detects placental bruit, but shows absence of foetal heart sounds.

Vaginal examination: Mucous membrane deeply congested; cervix soft and flaccid, devoid of muscular tonus. Os patulous, lips swollen and surrounded by erosions; a thin, sero-sanguinolent discharge of very foul and penetrating odor oozes from cervix. Head is presenting and ballottement easily obtained. Exploration of the cul de sac of Douglas discloses softening of lower uterine segment and an extensive inflammatory exudate on either side of cervix.

The diagnosis of ante-partum infection with retention of a decomposing foetus and generation of putrid gas in uterus was strengthened by husband's history, who stated that for the past five days patient had suffered from irregular chills, nausea and vomiting and a fetid discharge.

During the first twenty-four hours following admission patient had three severe chills, temperature oscillating between 103.5°–99.2° F., pulse 140–120, responding but slowly to stimulation, which consisted of whisky $\frac{3}{4}$ ss q. 3 h. and Tinct. Digit. M. v q. 2 h. Three vaginal douches of 1:3000 corrosive sublimate at a temperature of 115° F. were administered, followed by a gauze tamponade and cervical dilatation attempted under ether till index finger penetrated internal os. After thoroughly irrigating the cervical canal, a strip of iodoform gauze was packed in tightly to encourage dilatation. During night patient had one chill, temperature mounting to 102° F. at one

o'clock. She was very restless and troublesome and tried to disturb the dressing, which was removed on the following morning. The same afternoon temperature rose to 103.5° F. after a well-marked chill and as patient continued troublesome trional in gr. xx. doses every three hours, and whisky, $\frac{3}{4}$ ss every two hours was ordered. Examination showed that dilatation was progressing very slowly; a hypodermic injection of morphin gr. $\frac{1}{2}$, and hyoscyamin gr. 1-40, was then administered and genital tract thoroughly cleansed. A rather stiff catheter was next passed between uterine wall and membranes till fundus was nearly reached, then half an ounce of glycerine was injected. One hour later cervix had dilated sufficiently to admit three fingers; a transverse presentation with prolapse of right arm was found and version attempted, when suddenly a large volume of exceedingly fetid gas escaped from cervix, the lower segment closing around foetus in a condition of tonic spasm, while the fundus remained soft and flabby; version under these circumstances was deemed inadvisable and of no special advantage. A strong ligature was thrown around the right arm and disarticulated at the shoulder joint with long, blunt scissors, clavicle and scapula of same side were removed subsequently.

Lusk-Tarnier's axis traction forceps were then applied and securely locked over head and right side of chest and foetus slowly extracted while an assistant supported the fundus. The birth of the foetus allowed the retained gas to escape from uterus and a considerable quantity rushed out with force sufficient to cause collapse of the patient, who rallied somewhat with hypodermic stimulation. The placenta was found adherent and had to be detached manually; after delivery the uterus was thoroughly curetted and douched out with carbolic solution 1:40, temperature 120° F. Equal parts of tincture of iron and iodine were applied to the interior of uterus and vagina and the perineal body, which was partially lacerated. Uterus and vagina were then packed with gauze and patient returned to bed.

Examination of the foetus: Age about eight and a half months, much decomposed and putrid; probably has been dead for one to two weeks. The subcutaneous tissue and the organs were emphysematous, the brain appeared as a greenish pulp. The placenta was much in the same condition with the exception of a few isolated areas which were adherent to the uterus. As no marks of violence could be detected death was probably caused by the violent suicidal impulses of the mother.

The after-treatment consisted in the administration of ergot and strychnine to favor uterine contraction, with continuation of whisky, half ounce every hour. Every morning and evening packing was removed, the whole tract thoroughly cleansed and a bacillus of the following composition placed into uterus:

R Iodoformi, gr. xv.
 Acid, Salicylic.
 Acid, Boric, aa. gr. v.
 Amyli, qs.

M. f. bac. unum.—Preserve in dry salicylate of sodium.

The discharge soon became more profuse and purulent. Temperature remitted strongly in evening, ranging from 102–104.2° F. Pulse remained rapid and full throughout but was of low tension. Nausea, vomiting and persistent diarrhoea soon followed. Chills, variable in their severity, recurred daily. Puerperal ulcers made their appearance early in the second week and progressively attacked cervix, vagina and perineum, completely destroying the mucous membrane and eating deeply into the muscular coat. The perineal body suffered most, but happily the ulcerative process limited itself before the rectal mucous membrane had been perforated. Two large bed-sores developed over buttocks notwithstanding all care; they were circular and deep and suggestive of neuro-paralytic ulcers. On Feb. 23 there was a sudden discharge of blood from vagina resulting from an extension of the ulcerative process into hemorrhoidal veins; as the superficial tissue was so brittle, three deep ligatures were inserted and the bleeding vessels secured. Convalescence started about the end of March, but was very tedious. The discharge grew less and assumed a more mucous appearance. The perineal body, which had suffered severely, began to repair by cicatrization at the expense of the surrounding tissues. In order to prevent adhesions between the anterior and posterior walls, the vagina was lubricated daily with iodoform glycerine and an aseptic tampon placed in the fornix. The inflammatory exudate around cervix terminated in resolution, but left a slightly retroflexed uterus. The constitutional symptoms abated gradually and the patient was allowed to sit up at the end of the ninth week post-partum.

During the whole period of her illness marked mental depression prevailed with occasional outbursts of frenzy. Although still retaining suicidal tendencies, the impulses seemed to diminish in intensity and were only noticed during the attacks of paroxysmal despair, which augmented all mental phenomena. She retained ill-defined delusions of persecution and regarded her surroundings with great suspicion at first and later on with stolid indifference. Her replies were laconic and dull; at times she refused to talk, but sat in a chair staring vacantly into space. Her mind seemed entirely filled by the delusion that the child was yet in utero and often would she demonstrate by ges-

ture, when and how the foetus moved; the next moment she broke out in tears, wept and sobbed violently, but refused to enter into any explanation as to cause of her emotion. Trional and morphine, although exhibited in considerable quantity, exercised but little sedative influence and were useless, when frenzied; subcutaneous injections of hyoscyamine invariably controlled her violence. These mental crises occur once a month generally at or before the onset of the menstrual epoch, which rarely exceeds three days in duration. In the intervals between she remains dull, melancholy and depressed.

Outside of pregnancy, there is no other cause which could be assigned as capable of precipitating this attack of melancholia; later history, however, would tend to show that nervous manifestations of some form predominated in her family, which renders the prospects for ultimate mental recovery very grave.

Present treatment is entirely symptomatic and supportive; she receives a moderate quantity of wine with her meals and a tonic preparation containing iron and a bitter, and is compelled to take as much out-door exercise as is consistent with her mental and physical state.

A CASE OF GENERAL PARALYSIS.

REPORTED BY ELBERT M. SOMERS, M. D.,
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This paper bears upon a case of general paralysis which presented some unusual and noteworthy features in its course and offered typical lesions at the necropsy.

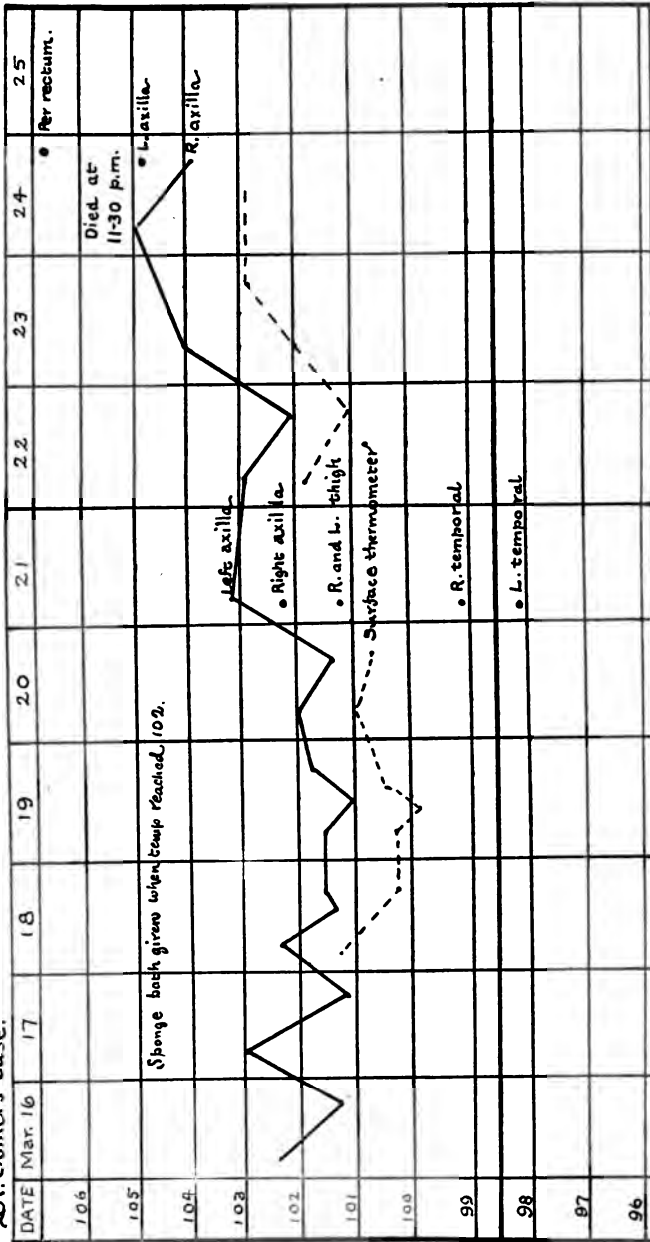
CASE No. 2761.—Female; nativity, United States; age, 58; married; education, common school; habits alleged as good. Diagnosis, chronic melancholia. Revised diagnosis, general paralysis of the apoplectic form type. Admitted May 3d, 1891. Duration of insanity previous to admission unknown. Former attacks none. Family history bad.

Mother, sister and brother were insane. Two sons are living and apparently well and in successful business. Patient previous to admission was depressed and suicidal, having attempted to do away with herself in a number of ways, notably by drowning. Had frequently accused her husband of being a libertine and a drunkard, also of frequently beating her. On admission she was rather reticent, depressed and seemed much exhausted from the journey. Physical examination found heart and lungs normal. There was partial loss of function of the arms and legs and which was symmetrical. The facial muscles also showed distinct incoördination and the normal folds were obliterated. Movements of the tongue were sluggish and deglutition was impeded. Speech was difficult; patient seemed to have little control of articulatory sounds; some words being loudly uttered, while others were only partially spoken; then again entire sentences were fairly spoken with only elision of a few vowels or the dropping of a few consonants. There was much improvement in her physical condition up to July. Could move limbs with more agility and even walk some with aid of the nurses. There was no facial change, however. Would answer questions hesitatingly though coherently. At times would become irritable and again very much depressed. During the month of July patient had a number of attacks which appeared to be apoplectic in character; that is, she would become quite stupid and have less use of her limbs either of one side of the body or the other and later would regain the loss somewhat. There was no essential change in patient's condition for the following two years. Irritability and depression of mental state, especially the latter, occurring with frequent relapses of physical condition. There was no exhilaration or delusions of grandeur. During the latter months of 1893 she suffered much from abdominal distension with obstinate constipation and required almost daily enemata. This condition was probably one of intestinal paresis. In March, 1894, patient made a very vicious assault upon a nurse without any provocation. During the year 1895 there were no noteworthy changes. Would sit up at times. Mentally, she was emotional, irritable and depressed, especially the latter condition predominating. Her physical state remained unchanged. March 16, 1896, approximately dates the beginning of her final illness. For some days previous she had been very gradually losing strength and showed less mental activity. Would frequently lie for hours in a drowsy condition from which she could be aroused, however, but could converse only in a rambling way, with thickness and clumsiness of speech. Her emotional and depressed state was uppermost, though at times was very petulant in her mood. At this date the general muscular system presented the characteristics of spastic paralysis. There seemed to be enough strength of the muscles, though the inability to centralize it was prominent. Would resist very energetically at times and also grasps

objects with considerable degree of firmness. However, when asked to grip your hand would make a few spasmodic efforts with but little show of strength. Repeated tests with *æsthesiometer* were without any satisfactory conclusions as patient was either too dull to appreciate cutaneous sense with any degree of accuracy or was partially anæsthetic, for at one time she would say she felt the prodding when none was made, and on the other hand complained of nothing when sharply pricked. The tendon reflexes were also unsatisfactory being irregular in response. The pupillary reflexes were very active; the pupils regular and normally dilated. The tongue, which was very thick and flabby, was protruded very forcibly and retracted with equal vigor. For the first time a peculiar tremor or spasm of the fingers, arms and pectoral muscles was observed, sometimes on one side of body, then on the other, frequently both sides being simultaneously involved. The spasms were gross in character and became worse during her emotional periods and voluntary movements. Lungs apparently normal; heart quite rapid; second sound accentuated but no murmur could be found. Pulse irregular and tension high. The body was bathed in a profuse perspiration. Temperature taken in left axilla was 102.4. The following day the facial muscles showed the same characteristic twitchings as those of arms, etc., and the expression was very grotesque at times. The pupillary responses were very active. The following day the urine was examined and showed reaction, acid, sp. gr. 1022, urea 2.8, albumen, a trace, a number of granular casts and a few pus cells. There was rapid failure of strength. Patient became more and more comatose with constant twitchings of the muscles of the upper extremities till death. These movements became less and less gross in character till they were very fine and fibrillary. During the last five or six days there was a remarkable loss of body weight and the face was very drawn. Up to the time of last illness her nutrition was always of the best.

In referring to the temperature curves in this case it will be noticed that the thermometer uniformly registered one degree lower in the right axilla, as denoted by the lower or dotted line, than in the left axilla, as seen in the upper curve. (Vide chart). A surface thermometer was used on two occasions, viz.: the 21st and 24th insts., and bore out accurately the differences of the two axillæ as found by the ordinary bedside thermometer. All these different temperatures were taken under equal conditions in order to lessen the question of possible inaccuracy. It will be noticed also that the surface temperatures at the right and left thighs were equal and that the right and

Dr. Somers's case.



left temporal regions showed a degree's difference. The final temperature which was taken at 4:30 P. M., about seven hours before death, was noted to be 107 per rectum.

There is but little satisfactory literature upon the comparison of local temperatures and their discrepancies in cases of general paralysis. There have, however, been many articles written attesting to the uniform elevation of body heat in different forms of general paralysis, viz.: the apoplectiform, epileptiform, etc. Clouston* noted that in the different forms of insanity the mean temperature was the highest in general paralysis and that in this disease the average evening temperature was always higher than the morning. Mickle† also observed nearly always the same evening rise. His observations, however, extend farther and reported the peculiarities of temperature in the apoplectiform and epileptiform types. In the former his results showed that the axillary temperature was the highest on the side of the body which was principally paralyzed; one case especially he showed as an example and of which we quote giving the right and left side temperatures for the last five days before death.

Temperature in right axilla.

1st day, 103. 2°
 2d " 103.82°.
 3d " 101. 8°.
 4th " 100. 2°.
 5th " 102. 5°.

Temperature in left axilla.

1st day, 103.1°
 2d " 102.9°.
 3d " 101.7°.
 4th " 100.3°.
 5th " 101.3°.

Yet he showed one case where the temperature was $\frac{1}{10}$ of a degree higher on the side less involved. As regards his results in the epileptiform type they uniformly showed a higher temperature in the parts most involved in the seizures. This case which we report bears no relation to the foregoing statements as regards temperature excepting in the apoplectic form variety of Mickle. Still it is interesting to observe any conclusions regarding the temperature of cases of general paralysis. The remarkable even differences in the right and left side temperatures of our case is

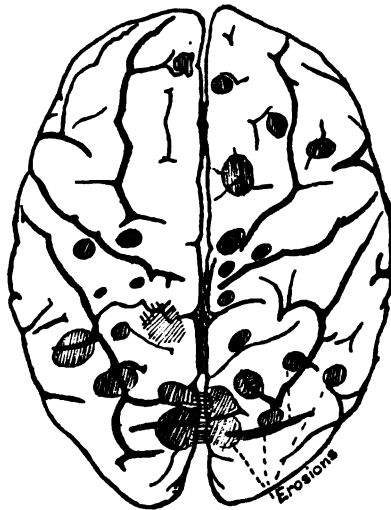
* Journal Mental Science, April, 1868.

† Journal Mental Science, April, 1892.

noteworthy more so from the fact that the patient, especially during her latter weeks, favored her right arm more than her left and still the left axilla registered the higher degree during her final illness.

The autopsy was performed twelve hours after death.

External appearance of cadaver,—rigor mortis first degree. There was slight deformity of chest due to left lateral scoliosis. There were a few scars on the abdomen and lower chest anteriorly which were whitish in color but non-indurated. The calvaria was easily removed and showed no essential gross changes. The dura was thickened and adherent in places to the pia on either side of the falx cerebri, especially on the right side near tentorium cerebelli. Upon removal of the dura eight ounces of bloody serum escaped. The pia mater was quite oedematous about the longitudinal fissure in the motor areas. The arachnoid in this locality contained the characteristic opaque jelly-like masses with here and there areas either mottled with white caseous deposits or striated with firm fibrous bands. The capillaries were tortuous and much congested, while through the jelly-like mass could be seen dimly the horizon of the convolutions. The pia mater was stripped from the convolutions leaving many erosions. (Vide diagram).



As will be seen the majority of erosions were along the convexity of the right hemisphere. The brain substance was somewhat congested with prominent perivascular spaces. The cortex was attenu-

ated along the convexity, especially at the anterior and middle lobes. The lateral ventricles were somewhat enlarged. The arteries at base of brain were sclerosed to a mild degree. The heart muscle was unusually friable and showed granular changes. The mitral valves were slightly thickened. The aortic intima was smooth and clear. No other gross cardiac changes could be observed. The lungs presented moderate congestion only. The kidneys were quite congested. The pyramids well-marked but the cortex of about normal thickness, however. The capsule was non-adherent. The liver and spleen presented no noteworthy changes beyond moderate granular degeneration. A calcareous plate was removed from the diaphragm, size of about a silver dollar. The weights of the different organs are as follows: brain, 41 ozs.; heart, $9\frac{1}{2}$; liver, $40\frac{1}{2}$; spleen, 4; right kidney, $4\frac{1}{2}$; left kidney, $4\frac{1}{2}$.

The symptoms in this case of general paralysis do not tally with the post-mortem evidences. While the brain showed typical lesions of general paralysis the mental symptoms during life were those of depression, apprehension, persecution and subsequent dementia. Her type of mental unbalance belonged to the classical insanity or *vesanias*, rather than to the congestive states. At no time were the expansive ideas, the content of mind and the general condition of well-being that so indelibly stamp the usual paretic, noticeable. The irritable state was confined to the early stages of the disease while the emotional characterized the onset of dementia. There were no facial tremors till the last few days of life and even then they were not typical. Neither was the speech of the static or staccato type but was purely spastic in character. Indeed, so confusing were her symptoms that her case remained somewhat doubtful to the end. In some respects the evidences were those of simple apoplectic dementia,* as indicated by the frequent apoplectic attacks with partial regain of affected areas, partial aphasia, and emotional and irritable states.

Still it is a well known fact that general paralysis in women frequently runs an atypical course and this case is certainly one showing a number of anomalies.

* Régis: Practical Manual of Mental Medicine (Bannister's Trans.) p. 463.

INSANE FAMILY GROUPS WITH CRIMINAL TENDENCIES.

BY E. H. HOWARD, M. D.,
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These family groups have been gathered from the records of the New York State Hospitals. While no attempt has been made to give elaborate histories, yet enough is shown to serve as food for thought.

Family group (1).—John C. and his brother Patrick were committed in December, 1884. John was forty-six, possessed of a collegiate education, and was a Catholic priest. Patrick was forty-two. They had lived together, and indulged freely in intoxicating liquors. A paternal uncle, two brothers and a sister were insane. Two years before his admission John was deposed by his bishop from charge of his parish, for conduct incompatible with his duties. He, with his brother Patrick, resisted his former parishioners, who were about to remove some of the foundation stones of the old church. Patrick mortally wounded one of these men. Both brothers were indicted together for murder in the first degree, and both were found to be insane.

Family group (2).—W. E. M. and his wife were committed in January and September, 1893. Both were afflicted with general paralysis, which had developed at nearly the same time, presumably from the usual causes. The husband died in February, 1894, and the wife remains in custody.

Family group (3).—On April 16, 1896, a mother and two daughters, all the members of one household, were committed on account of insanity, which had evidently continued for several years. A son from this family had been adjudged insane while on trial for murder, and is now in custody. The mother and older sister freely express delusions of persecution, to the effect that the water in their well was poisoned by neighbors; that enemies came around the house at night and marked their way by placing stones in the roadway; that a brother, who died by accident, was murdered by one of their enemies, and that they have been obliged to rush out into the highways, armed with knives and other weapons, to defend themselves.

Family group (4).—This group, in custody for several years, consists of one brother with recurrent mania, manifesting homicidal tendencies before commitment, and another brother with chronic mania, with a tendency to commit assaults. The mother of these men was insane but harmless.

Family group (5).—This group consists of two brothers in custody, with chronic insanity, both having been sentenced to life imprisonment for murder in the second degree. They have an aunt, two cousins and a brother insane.

Family group (6).—William and Edgar S., being committed about the same time, were found to be defective mentally, at times becoming excitable and disturbed. The father of both had been in custody on account of insanity. The younger was ordinarily good natured, but was easily excited by his brother into a dangerous, homicidal condition. The older was dissipated, reckless and improvident, and was the exciting cause of his brother's offenses.

Family group (7).—Frank and John R., brothers, aged forty-three and thirty-six, were both committed in April, 1895, with chronic insanity. They had lived together, and their history shows a record for each, of more than thirty previous convictions for intoxication and disorderly conduct.

Family group (8).—Timothy S. was committed with chronic insanity in April, 1892, having been convicted of robbery, and sentenced to sixteen years imprisonment. His brother Edward, an old-time criminal, was committed with chronic insanity in April, 1892, having been sentenced to fourteen years imprisonment for assault.

Family group (9).—In 1892, Felix, John and William McL., brothers and members of the same household, were committed as insane, having been convicted for robbery and burglary. Their mother, who kept house for them was of unsound mind, though never committed to a hospital. They frequently accompanied each other on their marauding expeditions, and were rarely found in the company of other offenders. They were quite skilful in eluding the officers, and endeavored to conceal their delusions. William, at one time, succeeded in covering up his insanity so cunningly, as to be reported to the court as of sound mind, by one of the best qualified examiners of lunacy. For many years this family was a terror to the community in which they lived, and more than twelve years of frequent arrests, and reports from examiners relative to their mental condition, was needed to bring about the result of their being held in custody continuously.

Family group (10).—This group consists of an aunt with chronic insanity, a father of eccentric manner and methods, and two sons, James and John. The younger and dominant one, being a paranoiac with criminal tendencies and vicious habits. They lived together in a suburban section of one of the inland cities, and for many years were a terror to the community. James delighted in getting groups of boys of school-age in barns and outhouses and teaching them vicious habits. After prolonged and determined effort the outraged community finally succeeded in securing the commitment of these brothers, in separate hospital, in such a manner that their continuance in custody was practically assured.

Family group (11).—This group consists of three sisters, two of whom had lived with the same man as husband, he having cohabited with the second after his wife was committed to the hospital.

No attempt has been made to report all the family groups of the criminal class in custody in this State, and many others could doubtless be quoted. While the influence of heredity has long been acknowledged, the consideration of communicated insanity* is of more recent date. These eleven groups exemplify the danger to the community when insane persons with criminal tendencies are allowed to maintain family relations. The dominant insane member of such families frequently endangers the mental equilibrium of the weaker ones, even if not insane. Persons of criminal and vicious habits are quite certain to be added to these families by marriage, and children of such undesirable parentage are added to the community.

The difficulty everywhere experienced in attempting to break up these families is largely due to the unsatisfactory methods of examination and commitment provided by the existing laws. The new insanity law, Chapter 28 of the Laws of 1896, provides for the appointment of a referee by any judge, in a case of suspected insanity, whose duty it shall be to take testimony, and make a report. It would appear that such an inquiry by a referee would enable the physicians and neighbors to bring to the attention of the court sufficient testimony to establish not only the mental unsoundness of the members of such families, but the great danger to the community arising from the continuance of family relations.

If the existence in a family of these deplorable conditions should be discovered by the officers, it would appear to be their duty to put the whole case before the court in such a manner as to throw upon the judge the responsibility of putting in operation an inquiry by a referee, which would establish that many persons of unsound mind, who would be harmless, and safe to be at large if members of respectable and mentally sound families are really a source of danger to the community, and detrimental to the public welfare when they are members of a family group with criminal tendencies.

* See article on Communicated Insanity by Charles W. Pilgrim, M. D., Superintendent of the Hudson River State Hospital, in the Popular Science Monthly for July, 1895.

THE RELIEF OF INTRA-CRANIAL PRESSURE IN
GENERAL PARALYSIS OF THE INSANE,
TABES DORSALIS, AND OTHER DIS-
EASES BY LUMBAR PUNCTURE.

BY WARREN L. BABCOCK, M. D.,

Second Assistant Physician, St. Lawrence State Hospital.

The surgical treatment of general paralysis has heretofore been confined to two operations, trephining and laminectomy. The past few months has witnessed the introduction of a third method looking toward the alleviation of the only indication for surgical interference, i. e., increased intra-cranial pressure.

Trephining, for the relief of brain pressure caused by fluid, was first suggested by T. Claye Shaw* in 1889 and the first operation performed, in July, of that year, by Harrison Cripps. The procedure found an earnest advocate in J. Batty Tuke† who latterly suggested laminectomy with permanent drainage in its stead.

The first attempt in this country to treat paresis surgically was by Charles G. Wagner,‡ at Utica. He trephined a negro paretic in March, 1890, and, though the case died six months after operating, much temporary benefit was manifest by an amelioration of the prominent mental symptoms.

The affirmative, though transient, results of the above observers were seriously called into question by the exhaustive negative report of five cases trephined by Macpherson and Wallace§ who reached the following conclusion:

"We believe that the present state of our knowledge of general paralysis, and our power to diagnose the disease at a sufficiently early stage, is so imperfect that as yet surgical treatment—at all events, by the method adopted by us—can be of no material benefit whatever."

* Shaw: Br. Med. Jour., Nov. 16, 1889; June 14, 1890.

† Tuke: Br. Med. Jour., Jan. 4, 1890; July 16, 1892.

‡ Wagner: Amer. Jour. Insanity, July, 1890.

§ Macpherson and Wallace: Br. Med. Jour., July 23, 1892.

Since the discussion evoked by the above reports, little has been heard upon the subject of surgical interference in this disease.

The operation of laminectomy, suggested by Tuke, whereby the dependent part of the sub-arachnoid sac was opened and drained, failed to give satisfaction owing to the difficulty in establishing permanent drainage and the increased liability to sepsis.

Surgical treatment, by any method whatever, looks toward the relief of pressure symptoms. These are caused by the great amount of fluid exuded into the lymph channels of the brain and meninges as a result of the cortical and meningeal inflammation in the first stage of the process, supplemented later by the compensatory exudation which follows atrophy and sclerosis. The nature of the fluid is a mooted question. Macpherson and Wallace (op. cit.) assume that it is at first an inflammatory exudate; that it occurs early and is primary to the sclerosis of nerve elements which follow. Bevan Lewis* who holds that the arterial changes are first to occur, claims that the excess of fluid is compensatory throughout the disease and follows the cortical nerve cell atrophy. He says: "This tendency to the accumulation of exudate in the sub-arachnoid lymph tissue receives a marked increment at a later stage of the disease; for when atrophic changes occur in the cortex as the result of impaired nutrition and degeneration of nerve elements, a great compensatory serosity of this region is established and the membranes become fairly waterlogged." Macpherson in a later article admits that the fluid may be compensatory in the late stages and argues that there are two stages of the fluid exudation—(1) the inflammatory exudate, and (2) the compensatory fluid exuded to replace shrinkage of cortical tissue. This dual hypothesis regarding its origin is entirely in line with what we know of the pathological anatomy of meningo-encephalitis. Certainly during the first stage, as proven by the presence of albumin in the fluid obtained by puncture and concomitant with the subacute inflammation

* Lewis: Text Book of Mental Diseases.

of the pia, together with the primary arterial changes, there is an exudation of serum into the lymph channels which communicate with the sub-arachnoid space. We know that simple inflammation in similar tissues equally vascular gives rise to serous exudate; as an instance the pleura and peritoneum.

Clinically little evidence of the inflammatory exudate is seen until the second stage when the atrophy of nerve elements occlude many lymph channels and open new ones of vaster dimensions. The primary vascular changes, i. e., inflammation of the tunica adventitia and the excessive development of the lymph—connective system of the brain, produces just that condition which will readily permit free osmosis of serum from the vessels. This fluid, compensatory in character as atrophy and degeneration of nerve elements progress, is reinforced by a true inflammatory exudate from the primary inflammation in some region of the brain where the process is acute, as it is well known that there may be an acute inflammation of both cortex and meninges in one part and a condition of atrophy and sclerosis in another. The fluid, therefore, presents the characteristics, more or less marked, of an inflammatory product throughout the entire disease, from its incipency to its close. That it is alone responsible for the symptoms of cerebral pressure we do not claim; that its removal produces an amelioration, temporary at least of many of them, has been demonstrated again and again by trephining, laminectomy and lumbar puncture; and that it alone, of all the pathological conditions present in the brain of a paretic, offers an indication for surgical treatment, by its removal, is equally obvious.

A résumé of the operative work, having as its object the removal of this fluid in excess, demonstrates, in most cases, some temporary improvement in the mental symptoms, such as headache, irritability, stupor, confusion of ideas and, in some instances, has afforded relief from persistent hallucinations and troublesome delusions. Tuke (op. cit.) reports two recoveries in the first stage in cases

which have since had the diagnosis called into question. In a report of recent cases trephined at Sterling, Macpherson (op. cit.) states that the course of the disease is evidently checked for many months by the surgical relief of pressure and suggests "that if we could only manage to diagnose general paralysis at a sufficiently early stage, we might then by operative interference check its aggressive march."

The transient improvement afforded by operation apparently depends on

- (1) Relief of pressure by removal of fluid;
- (2) Greater opportunity for brain expansion and pulsation by removal of bone;
- (3) Subsidence of meningeal inflammation by local depletion of blood vessels, and
- (4) Shock to nervous system as a direct result of operation.

Rapid re-accumulation of fluid is reported to have occurred in the majority of cases, and in some the development of focal symptoms following contraction of cicatrix in meninges at site of trephine opening. The attempt to establish permanent drainage by means of horse-hair, by the above mentioned operators, proved unsuccessful owing to the increased liability to sepsis and the tendency of the scalp wound to rapidly heal. Drainage after laminectomy, as previously mentioned, was also unavailable.

Paracentesis of the spinal dura or lumbar puncture is a procedure of recent evolution and was first advocated by Quincke* in 1891 for the relief of pressure in hydrocephalus. Van Ziemssen† later suggested its use in tubercular and purulent meningitis. Lichtheim‡ called attention to the diagnostic importance of the operation and demonstrated the presence of bacilli in the fluid in cases of tubercular and purulent inflammatory conditions of the

* Quincke: *Berliner Klinische Wochenschrift*, 1891, pp. 929-964; also, *Sammlung Klinische Vorträge*, M. F. 1893, No. 62.

† Van Ziemssen: *Neurol. Centralbl.*, May 1, 1893.

‡ Lichtheim: *Deutsche Medicinische Wochenschrift*, 1893, pp. 1, 186-1, 234.

meninges. Furbinger* reports results in over a hundred experimental punctures in eighty-six patients who were suffering from a variety of brain disorders and brought the therapeutic and diagnostic bearings of the subject prominently before the profession. In England the subject was investigated by Morton† and Paget‡ who report exhaustively without adding anything new to the discussion. In this country Jacoby§ first practiced the method, his recent report covering 35 cases, of whom 17 were cases of tubercular meningitis. He also reported two cases of subdural spinal hemorrhage punctured with marked improvement.

It was first performed in cases of general paralysis by John Turner¶ who claims that it fulfils, at least temporarily, all the conditions that result from trephining or the more elaborate operation of laminectomy. As far as known the first lumbar puncture in this country, in cases of paresis, was performed by the writer, in the St. Lawrence State Hospital, May 18, 1896. During the ten days following the first puncture the operation was performed twenty-two times on paretics in all stages, and other cases of brain or spinal trouble, without the production of unfavorable conditions and with the temporary amelioration of many prominent mental and motor symptoms. The operation itself is not difficult, and, if careful asepsis is practiced, is unattended with danger in uncomplicated cases. No fatal results following puncture of the subdural sac have been reported except in cases of cerebellar tumor. Furbinger, (op. cit.) had four deaths out of eighty-six cases and a post-mortem demonstrated that each of the four was suffering from some variety of cerebellar neoplasm. He attributes the fatal results, to the pressure exerted upon the vital centers of the medulla by the tumor, on removal of its fluid support.

Description of Operation.—(See cut.)—The operation as performed in this hospital is as follows: Table is

* Furbinger: (aba.) Jour. Ment. Nerv. Dis., April, 1896.

† Morton: Br. Med. Jour., 1891, II, p. 840.

‡ Paget: Lancet, 1893, II, p. 873; 1894, I, p. 931.

§ Jacoby: N. Y. Med. Jour., Dec. 28, 1895, and Jan. 4, 1896.

¶ Br. Med. Jour., May 2, 1896.



BABCOCK: RELIEF OF INTRA-CRANIAL PRESSURE.

first prepared by placing upon it a firm hair mattress covered with rubber sheet which has been washed in sol. bichlor. mercury 1-1000. Upon this patient is placed, in night gown, on right side, with knees flexed on abdomen, so as to separate lumbar vertebræ posteriorly. Lumbar region is cleansed with suds and water and disinfected with creolin or solution of chlorinated soda. A small sized aspirating needle, four inches in length, is disinfected in sol. acid carbolic 1-20. Two or three drops of a one per cent sol. of cocaine is injected one-half inch to the right of the spinous process of first or second lumbar vertebræ. Needle is inserted to the right of median line between first and second or second and third lumbar spines and directed upward and inward until it enters interval between lamina and then pushed forward into subdural space. As soon as this is entered the fluid oozes forth from needle in drops at a rate depending on degree of intra-cranial pressure. Head of needle is connected with sterilized glass tube and fluid conducted to a clean metric graduate. The operation lasts from fifteen minutes to two hours, depending on rate of flow, and the patient suffers little discomfort.

Condition and Symptoms during Operation.—If the patient is asked to cough, encouraged to take a deep inspiration or engaged in conversation the rate of flow is greatly increased. In case No. 1501 the number of drops per minute was increased from 20 to 38 by engaging patient in discussion upon the subject of his delusions. The assumption of an upright position also accelerates flow; in some cases it was augmented over 100 per cent by patient sitting upright, bending forward and talking. Any movement of the body, particularly those attended with increased intra-thoracic or abdominal pressure or forward flexion of the spinal column, provokes an increase in the number of drops per minute amounting in some cases to an almost steady stream for a few minutes. If the skin is anæsthetized with cocaine the patient experiences no pain on insertion of needle. In fact, one case (2465, acute delirium), fell asleep after injection of $\frac{1}{4}$ grain of morph.

sulph. was punctured and 73 c. c. fluid removed in 60 minutes without patient's awakening. Three of the eleven paretics fell asleep during operation and were later awakened by the intense cephalgia after a large quantity of the fluid had drained away. The subcutaneous fascia and especially the spinal ligaments offer some resistance to the needle, but after its point has penetrated these structures little difficulty is experienced. If the needle comes in contact with the cord, an increased sense of resistance to its progress will be detected by the operator and the patient will experience a few twinges of pain, which he often refers to his right leg. In such an event the needle should be withdrawn a few millimeters and its point deflected to the right. If it is then pushed forward carefully, it will enter subdural space at side of cord and its progress will soon be arrested by contact with body of vertebræ opposite its point of entrance.

The number of respirations increased, in most cases, as aspiration progressed. In one paretic in irritable stage where great intra-cranial pressure was quickly relieved by a rapid flow the respirations rose from 16 to 33 per minute and remained accelerated for two hours, gradually returning to normal. This certainly appears to be an instance in which the increased intra-cranial pressure exerted mechanical inhibitory influence upon the respiratory centers, and, naturally, as soon as pressure was relieved the respiratory rate temporarily increased. Another symptom illustrating the influence of this pressure upon the centers of the medulla was vomiting, which occurred during the latter stages of the operation in three cases, while several others complained of nausea.

Headache of an intense or excruciating character accompanied or followed aspiration in fully 90 per cent of cases. One patient became frantic from the intense cephalgia, and the operation was speedily discontinued, the pain subsiding in a short time.

Nearly all became restless after a few drams of fluid was removed, and moved about uneasily, although they com-

plained of little pain aside from the headache. Deep seated pain in the lumbar region was experienced by two of the more intelligent paretics. Diminished pain sensibility, common to the third stage of paresis, almost precludes the necessity of a local anæsthetic in advanced cases.

Arterial tension at the outset was high in three paretics punctured, and quite indicative of the degree of intra-cranial pressure present. It diminished perceptibly when flow became well established, and at close of operation pulse was soft, regular and increased in frequency, in fully three-fourths of the cases. Temperature remained unchanged throughout operation and revealed no variation from normal six hours later.

In cases of extreme pressure the column of fluid in tube oscillated synchronously with pulse beat until pressure was relieved by the comparatively rapid flow. This was especially apparent in paretics with high pulse tension, forcible apex impaction and accentuated second sound.

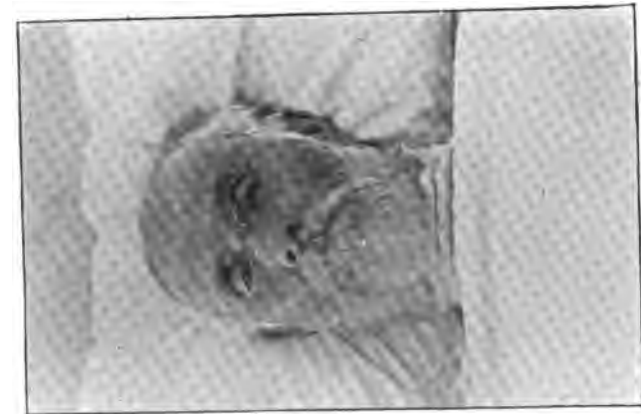
Pupils were not noticeably changed except in one case (1501). The inequality in this case disappeared after puncture and pupils have remained normal in size but they do not react to the light. In nearly all paretics punctured during third stage the deep reflexes were lost or in abeyance. In three instances they returned soon after puncture, but disappeared in two of these cases after three weeks, while the remaining case now has an exaggerated patellar response. In the tabes patient the knee-jerk had been absent for four months, but became feebly apparent after puncture, and can still be obtained, though greatly delayed.

An improvement in facial expression was well marked in three cases. Comparison of photographs taken before and after operation clearly reveals an indication of heightened intelligence, firmer control of facial muscles and an absence of greater part of the former blank expression. This improvement was particularly noticeable in the case of tabes dorsalis.

Changes in Condition and Symptoms Following Puncture.—*Ataxia*.—Greatly to the surprise of the writer more pronounced improvement was manifest in the ataxia than any other symptom of paresis. Locomotion was rendered less difficult after puncture in five out of twelve paretics in various stages. A case of stuporous melancholia, who was unsteady in gait and suffered from vertigo, improved in this respect quite noticeably. The following paretic whose ataxia almost disappeared after puncture is reported in full.

"No. 1501.—Admitted February 28, 1894; male; general paralysis; age, 50. Duration fourteen months previous to admission. Army veteran; doubtful specific history. On admission excited and disturbed; speech thick and conversation incoherent; pupils unequal; reflexes exaggerated; gait unsteady; no delusions but mildly exalted. Soon after admission became quieter and was given parole of premises. One year after admission was in fair strength; gained 10 lbs. in weight and continued happy. In November, 1895, rapidly became feeble and ataxia developed. In December was placed in bed; lost weight rapidly and continued untidy, paralytic and stupid until January, 1896, when delusions of strength became apparent. Remained in bed until May 20 when lumbar puncture was performed and 154 c. c. cerebro-spinal fluid was removed in 100 minutes. No shock followed operation and patient was returned to bed. The following day he arose and asked to be dressed. Ataxia was still apparent but caused little difficulty in locomotion; speech, formerly unintelligible, now readily understood though somewhat thick and hesitating. Mentally, brighter; delusions present but in the background; feeble strength and complains of headache. One week after puncture patient was stronger and daily assisted in ward work. At present writing, six weeks after operation, patient is strong, hearty and industrious. In five weeks he gained 12 pounds in weight. Formerly entirely helpless, he now cares for himself and assists in dining room and ward work. The noticeable features of this case are the rapid reversal to a condition approximating the second stage; the subsidence of paralytic and ataxic symptoms; the change from a mentally vacuous creature to a semi-rational thinking being and lastly, improved physical health."

In three other paretics improvement in gait was less marked but sufficient to attract the attention of the one benefited and excite the comments of observing fellow-patients. One man, a paretic in second stage, remarked, "My legs feel lighter; they feel less like sticks," and he



Before Puncture.



**After Puncture.
(One month.)**

CASE NO. 2275; LOCOMOTOR ATAXIA.

certainly made better use of them. How does the relief of this pressure alleviate ataxia? The following modes are at once suggested:

(1) By simple mechanical relief of pressure to which the co-ordinating centers are subjected.

(2) By improvement in the circulation of the motor centers of the cord, medulla and cortex.

(3) The withdrawal of fluid and the consequent improvement in the circulation of the cortical arterioles, re-establish, temporarily, the inhibitory functions of the higher centers.

The ataxia of the following case of tabes dorsalis was greatly benefited by puncture:

No. 2275.—Admitted October, 3, 1895. Male; age, 68 years. Subacute mania with locomotor ataxia. Duration unknown. Ataxia well marked on admission and slowly progressed to almost complete paraplegia. When punctured patient had been in bed for four months. Operation May 26, 1896; 95 c. c. clear cerebro-spinal fluid removed in 60 minutes. During operation he became irritable and disturbed; perspired freely; complained of headache, and respiration and pulse increased in frequency. Following day was confused, delusional and irritable. One week later patellar reflexes were apparent and he began to use his legs with the assistance of a chair. In a few days he walked without support to the dining room and has continued to get about with but little difficulty since. Facial expression, formerly dull and blank, has become fairly intelligent in its expression. General physical health has improved; he has gained in weight and grown considerably stronger. When the advancement toward a moderate degree of health in a case as far advanced in tabes as the above is so apparent, it is evident that the method is worthy of a more extended trial.

Speech and Muscular Tremors.—Moderate or slight improvement in phonation was apparent in three cases. Ability to pronounce words rich in consonants better than before operation was a feature in two cases. Hesitancy in speech not apparently changed. Better control of movements requiring fine co-ordination and lessening of general tremors was apparent in the paretics improved. Fibrillary twitchings of tongue continued unchanged. Localized or quasi-convulsive twitchings disappeared in

one case. In another paretic well advanced in second stage handwriting improved quite noticeably.

Grandiose or other Delusions.—In the majority of cases the usual delusions were absent for 48 hours after puncture. In the paretics who still show improvement the old delusions are absent or, at least, modified so as not to appreciably influence conduct. In the case of tabes and in one paretic (No. 1974) new delusions appeared as a result of the operation, but soon passed away. It is the writer's belief, founded on observation of the entire series of cases, that the mental symptoms will soonest relapse after puncture, that is, before the physical symptoms return in a disease which is essentially progressive.

General Mental or Intellectual Functions.—The majority were made brighter or more observing temporarily. Appreciation of surroundings became apparent in cases who had long since failed to recognize their true condition. Three paretics were in a condition of abject stupor, untidy, helpless, unobserving and inappreciative automatons, incapable of feeding or dressing themselves without assistance previous to operation. Two of them brightened up remarkably after puncture, becoming interested in the affairs of the ward and gave semi-intelligent attention to their personal wants. The condition of apathy and stupidity noted apparently depends on two conditions:—(1) The progressive dementia of paresis, (2) superadded artificial condition of intra-cranial pressure which mechanically inhibits the functional powers of the frontal lobes. The former condition is not amenable to treatment, while the latter holds out faint hopes of alleviation. It is quite obvious that the removal of this pressure allows the remnants of cortical cells to more or less imperfectly receive, originate and give forth quasi-healthful impulses. By doing away with the weighty stupor, due to pressure, it reveals the true degree of dementia present. In other words it may, in selected cases, take a paretic out of third stage and, temporarily at least, place him back in the second. By the removal of this artificial cloak of misleading pressure

symptoms it enables us to prognosticate the further progress of the disease with a greater degree of certainty.

Diagnostic and Therapeutic Possibilities of Lumbar Puncture.—Experimental puncture is a justifiable procedure in doubtful cases of meningitis even though symptoms of pressure are absent. Precipitation of sediment in fluid and staining may demonstrate the presence of germs in the exudate. Albert Frankel* reports a case in which the diagnosis of tubercular meningitis was made from an examination of the fluid thus obtained. Furbinger† reports similar cases. Stadelman‡ found the diplococcus of croupous pneumonia in the exudate of one case. More recently Caille§ in discussing tubercular meningitis suggests laying bare the dura by trephine and irrigating the sub-arachnoid space from the seat of puncture upward, the fluid escaping through opening in dura. This would also be applicable to any meningeal inflammation including infectious cerebro-spinal meningitis and the acute meningitis of acute delirium. The utility of this form of spinal lavage in general paralysis is doubtful. No indications suggest its possible efficacy in this disease. The writer, however, has the subject under investigation and hopes to find material for a further report.

The clinical symptoms of paresis that indicate the operation are those apparently caused by the increased intra-cranial pressure. The principal symptomatic indication is the frequently recurring periods of the second and third stages of deep stupor which is almost entirely due to a sudden or compensatory increase in the amount of cerebro-spinal fluid and partially masks or veils the underlying dementia. Upon its removal the true condition of the patient is often made apparent. Headache, vomiting, vertigo, convulsion, suffused face and high arterial tension are symptoms that suggest increased

* Frankel: Discussion, Congress Internal Medicine, Weisbaden, May 1, 1896

† Furbinger, Ibid. See Berlin Letter Med. Rec., May 30, 1896.

‡ Stadelman, Ibid. " " "

§ Caille: Proceed. Am. Ped. Assoc., Amer. Med. Surg. Bull., May 30, 1896.

cerebral tension, and, in the experience of the writer, are relieved, temporarily at least, by puncture.

The positive or negative individual results, together with short clinical notes, are set forth in the following brief report of cases:

(a) *General Paralysis*. (12 cases).

(For analysis of fluid see tables Nos. 3 and 4).

No. 2235.—Admitted August 28, 1895. Male; age, 60; duration, several months; fair strength; grandiose delusions; ataxic; tremulous and thick in speech. Condition did not change until March, 1896, when he entered third stage and became untidy, very ataxic, dull and stupid and quite feeble. First puncture May 18, 1896, 25 c. c. withdrawn in a few minutes. Following day was more observing, very restless and less ataxic. Week later pressure symptoms again apparent and patient was punctured a second time, 120 c. c. of fluid being removed in 85 minutes. Patient again manifested improvement, but relapsed in a few days. Evident re-accumulation of fluid.

No. 2385.—Admitted February 26, 1896. Male; age, 56; duration two years; large, obese and well-nourished. Presented usual physical symptoms of second stage, and was dull, stupid and unobserving. Delusions of grandeur detected one month after admission. Lumbar puncture as usual May 20, 1896, and 55 c. c. clear fluid removed in 60 minutes. Puncture difficult owing to excessive obesity. Following operation patient became brighter at once and later very irritable and restless. No further change. Now steadily failing.

No. 2462.—Admitted May 5, 1896. Male; age, 54; duration, several months; specific history with tertiary sequelæ; amaurosis result of optic neuritis; usual symptoms of paralytic dementia; physical symptoms predominate. Puncture May 20, 1896, and 50 c. c. fluid removed in 100 minutes. Patient went to sleep during operation but awoke in a few minutes suffering from dyspnoea and intense cephalgia. Pulse tension diminished and heart's beat increased in frequency during operation. Reflexes remained unchanged. Day following operation patient walked without assistance for first time since admission; was mentally brighter; talked with greater ease and grandiose ideas became persistent. Facial expression greatly improved. Eight days after first puncture had relapse into former condition and a second puncture was done. Less than one c. c. fluid was obtained and pressure seemed to be nil. Since last operation disease has progressed rapidly and patient is now well advanced into third stage. Present symptoms indicate advanced dementia without stupor and the cerebrospinal fluid is, therefore, calculated not to have re-accumulated.

No. 1501.—See page 360.

No. 2279.—Admitted October 7, 1895. Male; age, 42; duration, six months; non-specific history; well advanced in second stage. Two months after admission developed delusions of grandeur and became ataxic, greatly disturbed and quite feeble. Lumbar puncture as usual May 21, 1896, and 120 c. c. fluid removed in 120 minutes. Previous to operation repeated one phrase for days at a time and attention could not be attracted. After operation vocabulary increased and he answered questions readily. Excitement subsided and he gained eight lbs. in weight in two weeks. Ataxia and other symptoms unchanged. Five weeks after operation he became disturbed again but otherwise remained greatly improved.

No. 2425.—Admitted April 4, 1896. Male; age, 39 years; duration, one year; syphilis suspected. On admission presented usual symptoms of first stage. Improved under iodides. Symptoms did not call for puncture, but this case was selected so as to compare fluid with that obtained from patients in later stages. Operation May 29, 1896, and 66 c. c. fluid obtained in 60 minutes. Complained of headache toward close of operation and said he had shooting pains in leg. Two days later was less confused and said he could now remember things that he had long since forgotten. At present writing case has undergone no further change.

No. 2274.—Admitted October 2, 1895. Male; age, 65; duration, several months; no history of syphilis. On admission was confused, incoherent and excited. Paresis not suspected until he developed unequal pupils, exaggerated reflexes and commenced to grind teeth. Later became ataxic, tremulous, grandiose and manifested intense mental agitation (Silent emotion of G. P.) (Mickle). During second (irritable stage) he was punctured as usual and 80 c. c. fluid removed in 60 minutes. Disturbed during operation but went to sleep immediately after. Excitement subsided for several days and then returned with added vigor. Mentally, bright and comfortable during period of quiet, but delusions returned with return of excitement.

No. 1974.—Admitted April 17, 1895. Male; 46 years; duration, two years; specific history; symptoms of second stage. At intervals would present symptoms of great intra-cranial pressure, i. e., headache, suffused face, stupor, etc., somewhat resembling the so-called "congestive" attacks. During one of these periods lumbar puncture was performed and 95 c. c. fluid obtained in 70 minutes. Fluid was flowing freely when patient began to retch and vomit and needle was withdrawn. The following day patient was dull, confused and incoherent, and apparently worse than before operation. He remained in bed for two days and during this time his congestive attack disappeared. He has not had a recurrence although they were of weekly occurrence previous to puncture.

No. 1099.—Admitted August 15, 1893. Male; 42 years; duration, two years. On admission manifested usual symptoms of second stage. Patient advanced into third stage and was punctured June 5, 1896, and 68 c. c. fluid was obtained in 70 minutes. Flow was free at start but stopped suddenly after above amount had passed through needle. Result, negative.

No. 1895.—Admitted January 5, 1895. Male; age, 42; duration, two years; second stage. Rapidly advanced into third stage and was punctured June 3, 1896, and 85 c. c. fluid was removed in 25 minutes. The pressure, as evinced from the flow, was high at the outset. At time of puncture patient was blankly demented; totally paralyzed and quite weak. No improvement followed puncture.

No. 1964.—Admitted April 4, 1895. Male; age, 34; duration, few months; usual symptoms of incipient paresis. Advanced into second stage and was punctured June 5, 1896. Patient greatly disturbed soon after insertion of needle and it was found necessary to remove it. Enough fluid, however, (2 c. c.) was obtained for analysis.

No. 2297.—Admitted October 16, 1895. Male; age, 34; duration, unknown; usual symptoms of incipient paresis. Punctured four weeks after operation for radical cure of hernia and 30 c. c. obtained in 20 minutes, at the end of which time flow entirely ceased. During flow patient complained of intense cephalgia and when stream had nearly ceased he commenced to retch and vomit. In this case the amount of fluid was about normal in amount and the shock following its removal quite well marked. Pulse previous to puncture was 82 and high in tension. Upon removal of needle it was 64 and very soft and compressible.

(b) *Locomotor Ataxia*. (1 case).

No. 2275. See page 361.

(c) *Stuporous Melancholia*. (1 case).

No. 2305.—Admitted October 31, 1895. Male; age, 19; duration, two weeks. Stupor deepened after admission and was very great at time of puncture. Operation May 26, 1896, 110 c. c. fluid removed in 40 minutes. Flow free and rapid, indicating high degree of pressure. Patient had not spoken for three months, but towards close of operation spoke several sentences in a whispered tone. While fluid was running freely, he commenced to vomit and needle was removed. For 72 hours following puncture patient was brighter, more observing and less untidy. Formerly unsteady in gait, he commenced to walk with greater ease. At the end of that time he gradually relapsed and soon reached his former condition of abject stupor. In this instance the fluid evidently rapidly re-accumulated.

(d) *Simple Melancholia, with Pressure Symptoms.* (2 cases.)

No. 2398.—Admitted March 20, 1896. Male; age, 40; duration, several weeks. Soon after admission became stupid, developed photophobia and complained of intense headaches. Iodides failed to relieve and puncture was tried as an experiment. Operation May 28, and 95 c. c. of fluid removed in 55 minutes. Immediate relief from above symptoms was afforded for 24 hours, at the end of which time they again returned, probably concomitant with the re-accumulation of fluid.

No. 2475.—Admitted May 28, 1896. Female; 47 years; duration, 18 months. The following symptoms present on admission suggested that puncture might be of benefit. Almost continuous headache, slight stupor; photophobia; elevation in temperature and sleeplessness. Patient was anesthetized with chloroform and punctured June 3, 1896; 45 c. c. clear fluid was removed in 30 minutes. Almost immediate relief from the most troublesome symptoms became apparent. Headache and stupor disappeared at once. She slept 8 hours the following night and for three weeks thereafter slept from 6 to 9 hours nightly. Temperature returned to normal and remained thus for 20 days when it went up to 99.2°. Photophobia disappeared at the end of 48 hours and has not since returned. Patient now presents evidence of a re-accumulation of the cerebro-spinal fluid after a period of comparative comfort lasting twenty days.

(e) *Organic Dementia.* (1 case.)

No. 2376.—Admitted February 15, 1896. Male; 16 years; duration, one year. Commenced with localized spasms which occasionally became general. Motor aphasia, deafness and dementia gradually followed. Punctured May 29, 1896, and 45 c. c. fluid removed in 46 minutes. Patient was a trifle brighter for 24 hours, but no further improvement was recorded.

(f) *Status Epilepticus.* (1 case.)

No. 2401.—Admitted March 24, 1896. Male; age, 41; duration of epilepsy, 34 years; maniacal outbreaks following convulsions for past two years. On June 17, 1896, had two severe convulsions followed by mild localized spasms and immediately became unconscious. Albumen and casts were found in urine and uræmia was suspected as convulsions had ceased. Punctured June 20, and 65 c. c. fluid removed in 15 minutes. Pressure very great as the first flow was a steady spurt. At end of 15 minutes pulse became soft and skin moist and clammy. Needle was removed and patient lightly stimulated. Good reaction followed and much improvement speedily manifest. Patient became semi-conscious, moved about uneasily and appeared stronger.

After 24 hours stupor deepened, heart's power failed and would not respond to stimulants. Death occurred the following day.

(g) *Acute Delirium*.* (1 case).

No. 2465.—Admitted May 13, 1896. Male; age, 46 years; duration, 11 days. Delirium continued and temperature remained elevated for three weeks after admission when he was punctured and 95 c. c. fluid withdrawn in 60 minutes. Fluid clear on exit but contained flocculent precipitate after standing 24 hours. Temperature immediately returned to normal after puncture and remained thus for six days. Delirium subsided and patient's attention could be readily attracted. Began to take nourishment more readily and sleeplessness abated. Improvement continued for one week when temperature went up to 100.6° and his delirium returned with added severity. Physical strength was greatly reduced by his prolonged delirium and he died June 17. (For analysis of fluid see table No. 4).

Amount and Nature of Fluid Obtained by Lumbar Puncture in General Paralysis.—Table No. 1 is self-explanatory.

Table No. 2 shows findings obtained in cases other than paresis and is inserted as an aid to comparative study of results.

Amount of Fluid Obtained by Puncture.—Ranged from 154 c. c. in the case of a paretic in third stage to less than one c. c. in a case of paresis punctured for the second time

* Efforts were made to demonstrate the germicidal nature of delirium grava by the bacteriological examination of the cerebro-spinal fluid obtained from this case and the inoculation of rabbits. Sediment was precipitated by centrifugal machine, stained by Gram's method and mounted in balsam. Micrococcus pneumoniae croupousæ and streptococcus pyogenes were found on all slides, the former in great numbers and the latter in scattered chains. Rabbits, inoculated with the fluid which was obtained under aseptic precautions and kept at body heat until injected, were but slightly influenced by first inoculation, one showing a slight rise of temperature. Spinal dura of this patient was aspirated five minutes after death and another pair of rabbits inoculated. Temperature of one rabbit went up to 103.6°, he refused to eat and appeared quite ill, recovering after 48 hours. Second rabbit evinced milder infection and gave birth to seven young the following day, possibly an abortion, although they were close to term if the premise be correct. The turbid fluid obtained by second puncture (after death) was found to contain the same cocci as first specimen. Autopsy revealed extensive meningitis and a variety of interesting conditions. Owing to recent illness and death of this case the writer's experiments regarding its bacterial nature are yet far from conclusive. The clinical history, bacterial experiments, autopsy and microscopical findings, of this case, will be reported in full at as early a date as possible.

[The writer takes this opportunity of disclaiming any responsibility for the sensational newspaper reports which have been going the rounds of the New York Sunday press regarding the discovery of the so-called "germ of insanity."]

TABLE No. I.
FOURTEEN PUNCTURES IN TWELVE CASES OF PARESIS.

Case No.	No. of Punctures	Amt.		Rate of Flow at start.		Rate of Flow at close.		Time. Minutes.	Degree of Pressure.	Remarks, results, etc.
		C.	C.	Drops per min.	Drops per min.	Drops per min.	Drops per min.			
2235	3	25		12		4		18	Moderate.	Temporarily imp.; re-accumulation in six days.
Same (2)	3	120		31		6		90	High.	Two weeks later, slightly improved.
2385	2	55		33		4		60	Moderate.	No change.
2462	3	50		13		Ceased.		100	Low.	Improved for six days.
Same (2)	3	—1		4		Ceased.		5	Very low.	Apparently did not re-accumulate.
1501	3	154		40		6		100	Very high.	Immediate improvement; no relapse.
2279	3	120		28		6		120	High.	Moderate improvement continues.
2425	1	66		22		11		60	Moderate.	No change.
2274	2	80		19		4		60	High.	Temporarily improved.
1895	2	85		38		10		25	Low.	No change.
2297	1	30		8		Ceased.		30	High.	No pressure symptoms.
1974	2	82		20		7		70	High.	Congestive attacks do not recur.
1099	3	68		22		Ceased.		70	Moderate.	No change.
1964	2	2		?		?		5	Moderate.	Became disturbed and needle was withdrawn.

TABLE No. 2.
SHOWING AMOUNT OF FLUID, RATE OF FLOW AND DEGREE OF PRESSURE IN SEVEN CASES, OTHER THAN PARESIS.

Case No.	Diagnosis.	Amt. C. C.	Rate of Flow at Start.		Rate of Flow at Close.		Time.	Degree of Pressure.	Remarks, Results, etc.
			Drops per min	Drops per min.	Drops per min.	Min.			
2305	Stupor. melan.	110	23		18		40	High.	Improved for 72 hours.
2275	Locom. ataxia.	95	36		10		65	High.	Permanent improvement.
2376	Organic cereb. dis.	45	24		5		46	Low.	No change.
2398	Simple melan.	95	41		10		55	High.	No change.
2465	Acute delirium.	73	44		5		60	High.	Greatly improved for one week.
2401	Status epilepticus.	60	58		7		15	Very high.	Fair temporary reaction.
2475	Simple melan.	45	60		20		30	High.	Improved for 20 days.

where the pressure seemed to be nil. In the latter case (2462) a second puncture was determined upon after patient had relapsed from the beneficial effects of first puncture. Only a few drops of fluid were obtained on first insertion of needle, and it was withdrawn, examined, and found pervious, and again inserted with a like result. The explanation of this patient's relapse is not clear unless it be that dementia rapidly progressed during interval between the first and second punctures and brought about a return of the symptoms which were relieved by the first removal of fluid. The patient from whom the maximum amount of fluid was obtained showed the greatest improvement. (See case 1501, p. 360.) This fact argues for the removal of as great a quantity as possible in cases not too far advanced into third stage. In suitable cases, it is justifiable, in the opinion of the writer, to adopt various means to augment the flow, such as engaging patient in conversation, carefully elevating him to a sitting posture, etc. In studying table No. 1 comparatively it is found that the average amount obtained from paretics in first stage is 48 c. c. As the second stage appears, the inflammatory exudate is augmented by the compensatory fluid and it is found to have increased to 75+ c. c. As atrophy and sclerosis progress the amount continues to increase, and is found in the third stage to have reached an average of 89+ c. c. This great increase, particularly apparent during second stage, lends support to the dual hypothesis regarding the origin of the fluid, i. e., first inflammatory, and later compensatory. The normal amount of fluid in the healthy adult is estimated by Magendie to closely approximate 60 c. c.

Rate of Flow and Degree of Pressure.—The rapidity of the flow or the number of drops per minute will approximately determine the degree of intra-cranial pressure in each case. To ascertain the rate of flow in health or in cases free from organic brain or spinal disease, two patients convalescing from functional mental disease and in good physical health were aspirated. The flow in both cases

averaged about ten drops per minute, stopped entirely on elevation of tube, and ceased altogether after a few c. c. of clear fluid was collected. Experiments with these cases and others similar enable us to estimate, sufficiently accurate for all practical purposes, the normal rate of flow. This varies from six to ten drops per minute at the outset if tube is lowered and the needle previously described is used. In cases of extensive organic brain or spinal disease with symptoms of increased pressure the normal rate of flow was increased nearly tenfold. (See tables No. 1 and 2.) Of all cases aspirated, paretics in third or irritable part of second stage evinced the highest degree of intra-cranial pressure. Patients whose arterial tension previous to puncture was high gave a rapid flow at outset but soon became depleted. The blood vessels of the cerebro-spinal axis are subject to great and sudden variations in tension. When at their fullest they greatly augment the intra-cranial pressure and lead one to suspect an excess of cerebro-spinal fluid. In order to avoid mistaking the intra-cranial pressure due to increased arterial tension for pressure due to excess of fluid, the heart and peripheral blood vessels should be carefully examined. In cases with a hard pulse and an accentuated second sound it would be well to use nitro-glycerine or aconite preliminary to puncture. Paretics in the first stage rarely show more than a moderate degree of pressure. The intra-cranial tension, however, progressively increases as the nerve elements atrophy and at end of second or onset of third stage seems to be at its height. It then slowly declines so that only a moderate degree exists at death, except in cases who died during a congestive or convulsive attack. The cerebro-spinal pressure in the one case of locomotor ataxia punctured was high, but its bad effects were mainly manifest on the cord. The patient with status manifested, obviously, the highest degree of pressure and contrawise evinced the most rapid re-accumulation. To secure lasting benefit in these cases it is apparently quite necessary to establish some means of permanent drainage.

Re-accumulation of Fluid and Permanent Drainage.—

In the great majority of cases the fluid re-accumulates more or less rapidly. Paretics in second stage give evidence of a re-accumulation much quicker than any other class of cases in the experience of the writer. This fact is understood when it is remembered that during this stage of paresis the patients are generally disturbed, congestive or convulsive attacks are frequent and the atrophy of nerve elements most active. In patients punctured during first stage the fluid re-accumulates very slowly, while the third stage shows great variation. One case in third stage (1501) has yet shown no evidence of re-accumulation, while another in same stage (2462) was punctured a second time without obtaining but very little fluid. Still another case did not show evidence of re-accumulation for two weeks. It is thus apparent that the pressure is least liable to recur after puncture in the third stage, especially if done early in this stage before the physical health becomes greatly reduced.

The case of tabes punctured has yet shown no evidence of a return of pressure. The excess of fluid in these cases is evidently altogether an inflammatory exudation and apparently re-accumulates very slowly. In a case essentially progressive a return of pressure symptoms should be looked for after several weeks or a few months at the most. In such an event a second or even a third or fourth puncture should be performed unless low physical health offers a contra-indication. The case of acute delirium was greatly improved for one week during which time the bodily temperature continued normal. It is quite unlikely that the second acceleration of temperature and return of delirium depended in any degree upon the re-accumulation of fluid, but rather upon an extension of meningitis.

The case of status gave evidence of almost immediate re-accumulation, while the patients with melancholia also manifested symptoms indicating a return of the fluid.

All efforts to establish permanent drainage have thus far proved futile. Its unsuccessful use after laminectomy and

trephining has been already mentioned. I fail to see how any permanent good may result from drainage. The underlying sclerosis and atrophy in paresis would evidently continue even though drainage were free. The disagreeable pressure symptoms, however, would be held in abeyance thereby and the general conditions of the patient rendered more comfortable for a time.

Analysis and Composition of the Fluid Obtained by Puncture.—The quantitative estimation of ingredients was done according to Purdy's centrifugal method and is stated in percentages of bulk measure. This method may be open to criticism but, if in error, the relative amounts remain unchanged. Normal cerebro-spinal fluid according to Flint* "is transparent and colorless, free from viscosity, of a distinctly saline taste, an alkaline reaction, and it resists putrefaction for a long time. It is not affected by heat or acids. It contains a large proportion of water, a considerable quantity of sodium chloride, sulphates, carbonates, and alkaline and earthy phosphates. In addition it contains traces of urea, glucose, sodium lactate, fatty matter, cholesteroline and albumin." Foster† says "the specific gravity is about 1010 and the solids average one per cent. Albumin is generally absent and the copper reducing substance is not glucose but pyrocatechin."

Table No. 3 gives the analysis of fluid from the twelve paretics punctured.

Table No. 4 gives the composition of fluid obtained by puncture in cases other than paresis.

The composition of the cerebro-spinal fluid in paretics varies according to the stage of the disease and physical condition of the patient at the time of puncture. The amount of albumin present in all stages was in excess of that present in health; in fact, it is doubtful if albumin exists in healthy cerebro-spinal fluid. Flint (op. cit.) says that a trace is usually present, while Foster (op. cit.) states it does not exist in any quantity. At all events, if present,

* Flint: Human Physiology, p. 589.

† Foster: Text Book of Physiology, p. 879.

TABLE No. 3.
SHOWING COMPOSITION OF CEREBRO-SPINAL FLUID FROM TWELVE PATIENTS.

Case No.	Stage.	Amt.	S. G.	Reaction.	Albumin per ct.	Chlorides per ct.	Sulphates per ct.	Phosphates per ct.	Urea per ct.	Sugar or Pyroca- techn.	Other Ingredients.
2235	3	25	1007	Neut.	.015	.025	Trace.	Trace.	Trace.	o	No globuline.
Same (2)	3	120	1007	Neut.	.02	.045	Trace.	Trace.	Trace.	o	No globuline.
2385	2	55	1007	Neut.	.02	.025	Trace.	Trace.	Trace.	o	No globuline.
2462	3	50	1008	Neut.	.01	.035	Trace.	Trace.	Trace.	o	No globuline.
Same (2)	3	—1	?	Neut.	Present.	?	?	?	?	o	Quantity too small for analysis.
1501	3	154	1004	Neut.	.005	.04	.045	Trace.	Trace.	o	No globuline.
2279	3	120	1003	Neut.	.005	.03	.025	Trace.	Trace.	o	No globuline.
2425	1	66	1007	Alk.	.015	.045	Trace.	Trace.	Trace.	o	No globuline.
2274	2	80	1008	Neut.	.02	.045	.01	Trace.	Trace.	o	No globuline.
1895	2	85	1007	Neut.	.015	.035	Trace.	Trace.	Trace.	o	No globuline.
2297	1	30	1008	Neut.	.02	.03	o	o	o	o	No globuline.
1974	2	82	1010	Neut.	.025	.04	Trace.	Trace.	Trace.	o	No globuline.
1099	3	68	1008	Neut.	.015	.03	Trace.	Trace.	Trace.	o	No globuline.
1964	2	2	?	Alk.	Present.	Present.	?	?	?	o	Quantity too small for analysis.

TABLE No. 4
SHOWING COMPOSITION OF CEREBRO-SPINAL FLUID IN CASES OTHER THAN PARESIS.

Case No.	Diagnosis.	Amount.	S. G.	Reaction.	Albumin per ct.	Chlorides per ct.	Sulphates per ct.	Phosphates per ct.	Urea per ct.	Sugar or pyroca-techn.	Other Ingredients.
2305	Stup. melan.	110	1010	Alk.	Trace.	.0375	Trace.	Trace.	Trace.	0	
2275	Loc. ataxia.	95	1010	Neut.	.005	.04	.001	Trace.	Trace.	0	
2376	Organic cerebral dis.	45	1010	Neut.	.005	.045	Trace.	Trace.	Trace.	0	
2398	Simple melan.	95	1009	Alk.	.005	.0275	Trace.	Min. trace.	Trace.	0	Protagon present.
2464	Acute delir.	73	1010	Neut.	.0325	.07	Trace.	Trace.	Trace.	0	Globuline trace.
2401	Status epilep.	60	1010	Neut.	.03	.04	Trace.	Trace.	Trace.	0	
2475	Simple melan.	45	1010	Neut.	.005	.03	Trace.	Trace.	Trace.	0	

the quantity is so minute that it is scarcely recognizable by the usual tests. In the fluid of all cases of paresis punctured it was present in ponderable quantities. Two paretics were punctured during the first stage. The fluid of one contained two per cent, while the other contained one and one-half per cent. Five were punctured during second stage and the analysis showed an average percentage of a little over two per cent for this stage. Seven punctures were made in the third stage and it is here that the greatest variation is found, the amount of albumin ranging from .005 to .02 and averaging .012. This reduction of one per cent supports the theory that the fluid is firstly, inflammatory, and secondarily, compensatory. The amount of albumin present in the first and second stages while the inflammation is acute and active is double in quantity that present in the third stage where the inflammation has given place to atrophy and sclerosis and the exudation becomes compensatory.

The albumin in cases other than paresis ranged from a trace in a case of melancholia to over three per cent in the case of acute delirium. The presence of this comparatively large quantity in the case of delirium grava shows that the albumin is a direct resultant of the acute inflammatory process in the meninges and argues in favor of the assumption that its presence in estimable quantity is always pathological rather than physiological. The case of status was found to have three per cent thirty-six hours previous to death and a diagnosis of secondary acute meningitis was made on the strength of its presence. At the autopsy the pia and arachnoid were found to be acutely inflamed and there were small ecchymoses between the two membranes in several localities. The other cases in table No. 4 contained scarcely more than a trace of albumin and no significance was attached to its presence.

The chlorides in the spinal fluid of paretics ranged from four to two and one-half per cent and are evidently greatly in excess. Chlorides in excess in any part of the

system are usually indicative of increased metabolism and an increase in paresis would naturally be expected. The average for the three stages was respectively .035, .04 and .0375, the variation being insignificant.

Chlorides were present in excess in the majority of cases punctured other than paresis. Here, also, the general functions were below par and tissue metabolism faulty. The case of delirium whose tissue waste was enormous, losing as much as three pounds daily in weight, gave a percentage of chlorides as high as seven per cent, the highest in the series. The cases of locomotor ataxia, status epilepticus and organic cerebral disease each show over four per cent on analysis, while the cases of melancholia averaged three per cent. The amount of chlorides in the cerebro-spinal fluid in health has been variously estimated, the consensus of opinion placing the amount at less than one-half of one per cent.

Sulphates, phosphates and urea were present in traces in all cases punctured, but as they all occur in small quantities in healthy spinal fluid little clinical significance can be attached to their presence.

Copper reducing substances were absent from the fluid of all cases, although Foster (op. cit.) states that pyrocatechin usually occurs in healthy fluid. Globulin was also absent from the fluid of several paretics and was only found in the case of acute delirium. Protagon, regarded by Liebreich as the principal constituent of the cortical cells and brain substance, was tested for and found in the case of acute delirium.

The specific gravity of the cerebro-spinal fluid in general paralysis is generally lower than normal. In one case in the third stage it was found to be 1003. From this low figure it ranged up to 1010, one case only reaching that figure, which is considered to be the normal. The average for the 12 cases was less than 1007. The specific gravity of the fluid from cases other than paresis closely approximated the normal as will be seen by a reference to the table.

The reaction of the fluid was neutral in over 90 per cent

of the paretics and in three-fourths of the remaining cases. The normal reaction of the fluid is neutral or faintly alkaline. In no case did it show great alkalinity or even faint acidity. Bevan Lewis* states that he has found it to be acid in reaction in paretics dying in third stage. He is evidently in error and the acidity he noticed probably a post-mortem change.

A careful study of results brings out the following conclusions:

(1) Lumbar puncture affords temporary relief from pressure symptoms in over fifty per cent of cases of paresis submitted to the operation.

(2) The most beneficial effects are manifest over motor inco-ordination, i. e., ataxia, tremors, etc.

(3) Analysis of the fluid obtained in paresis shows that it contains an inflammatory product (albumin) throughout all stages.

(4) It may be of benefit in locomotor ataxia, status epilepticus or organic cerebral disease and deserves further trial in these cases.

(5) It presents excellent diagnostic possibilities, particularly in meningeal inflammations.

(6) It does not sufficiently benefit melancholia with pressure symptoms to warrant its use in this disease, and lastly

(7) Re-accumulation usually occurs within from three to ten weeks when a second or even a third puncture is indicated if patient's condition admits.

* Op. cit., p. 437.

MENTAL SYMPTOMS ASSOCIATED WITH ARTERIO-SCLEROSIS.

By RICHARD H. HUTCHINGS, M. D.,

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In a clinical lecture at the Hôpital Bichat in 1890 Huchard called attention to certain mental symptoms associated with cerebral arterio-sclerosis which he terms cerebral meiophragias.* These are dependent upon a diminished amount of blood supplied to the cortical cells through the thickened vessels—vascular stenosis. Among them he mentions temporary aphasia, transient palsies and slight confusion in the use of words which only appear when mental fatigue supervenes and entirely disappear after repose. The effects of mental fatigue upon the insane are evinced in a more pronounced form than in normal individuals, and it is well known that efforts at attention by them are frequently followed by incoherence of speech and mental excitement. This tendency is turned to practical advantage in eliciting the delusions of the insane; a person who is ordinarily coherent and composed will frequently in a prolonged conversation break down and express delusions that have been carefully concealed. The destruction of nerve cells produced by attention and conversation is not promptly restored when there is extensive disease of the cerebral arteries and as inhibition, the highest function, is first to suffer, the result is loss of co-ordinate action between the several parts of the brain causing the temporary aphasia, transient palsies and mental confusion observed by Huchard. The condition of cerebral arterio-sclerosis has not received the attention which its importance seems to entitle it, and it is probable that the symptoms are not yet clearly differentiated from those attributed to the contracted kidney which frequently co-exists. It has seemed, therefore, advisable to record a paroxysmal case

* Journal de Médecine et de chirurgie pratiques. Quoted from Sajous Annual, 1891.

which is one of a series under observation at the St. Lawrence State Hospital in which arterio-sclerosis is pronounced and disease of the kidney has been excluded by repeated examination of the urine and by absence of symptoms referable to the kidneys. This man while living in the quiet and seclusion of the hospital is to all intents and purposes rational and sane, but when exposed to the vicissitudes of wage-earning and competition in the world breaks down after an interval, which is progressively growing shorter as his disease advances, and is returned in a condition of incoherence and excitement. After an interval of rest his excitement and incoherence vanish and he returns to his quasi-normal condition until unusual conditions as anxiety, mental or physical overwork or some intercurrent bodily affection disturbs the precarious balance between the supply and demand in his brain, when his old symptoms crop out again always in the same form.

CASE No. 603.—Male; age, 35; single; occupation, gardener; habits intemperate. Mother demented. Admitted May, 1892. He is said to have had "several" previous attacks which lasted for a few days each and were less severe than this one. He had always been a steady drinker, but had not drunk to excess recently. This attack, which began suddenly, had lasted for five days; the medical certificate stated that he was in a condition of maniacal excitement, restless, sleepless and violent. On admission he was greatly excited, he talked constantly and paid no attention to what was said to him. He continued more or less disturbed during the first month, gradually becoming quiet until June 10th when it was noted that all evidences of insanity had disappeared. He was employed on the ward regularly and had parole of the grounds; on June 16th he was discharged as recovered. Before leaving the hospital he was admonished regarding his intemperate habits and he determined to avoid them in the future. After this attack he remained well for three years, but on April 10th, 1895, he was readmitted in a condition similar to the first having been insane five days. He was incoherent, noisy and restless and was worse when in the presence of others than when alone. April 17th. He has become quiet and is fairly rational and is now employed. May 13th. Has continued quiet and rational and enjoys parole of the grounds. June 6th. Discharged recovered.

After he had recovered he stated that this attack had been brought on by fatigue while caring for his father

during sickness and he had not used liquor to excess. After eleven days of freedom he was again brought to the hospital in his old condition of incoherence and excitement. The certificate stated that "He talked constantly for one hour in an incoherent manner, going from one subject to another without connection." June 20th it was noted that he had become quieter and more rational. He rapidly regained his self-control but suffered three brief relapses of short duration in which he was incoherent and noisy; during these attacks he appeared conscious at the time, but afterward had but slight recollection of what he did. The last of these attacks occurred in October, but he was kept under observation for six months during the whole of which time his appearance and manner indicated entire sanity. Employment was obtained for him at home and he was discharged on March 23d. This attack was said to have been caused by overwork and exposure to heat.

On this occasion he was at liberty only five days; on March 28 he was admitted to the hospital for the fourth time. The first indications of insanity were observed on the day following his arrival at home when he "talked queerly" and gradually became more incoherent and excited. The examining physicians certified that he had not had liquor in any form. When admitted he was noisy and exalted, talked almost constantly and gesticulated dramatically. He remained in this condition for four days when his excitement finally disappeared and he has been coherent and composed since (three months). He is a thick set, muscular man, 5 feet 6 inches tall and weighs 160 lbs.; his hair is becoming thin in front. There is fairly well marked arcus senilis in both eyes, seen plainest in outer border of right cornea; his pupils respond sluggishly to light and accommodation; pupils of normal size and regular. The vascular system shows distinct changes; the radial arteries are prominent and firm, the temporals can be readily felt, the tension of the pulse is rather high. Ophthalmoscopic examination of the eyes showed in the right a disk normal in detail; the arteries were numerous and small presenting

a wavy course. The reflex was not distinct, the veins were filled with dark blood. Left eye—fundus clear; the arteries were numerous and small; the reflex in a few was distinct, in others obliterated. The arteries after emerging from the center of the disk rose above its surface and entwined with the vein. Veins normal. The heart is enlarged, the increase being apparently in the left ventricle. The apex is found in the sixth intercostal space three and a half inches from the median line and two inches directly below the left nipple; its action is forcible and regular. The first sound is clear; the second sound accentuated, there is no murmur. The lungs are normal. His urine has been examined on several occasions and neither casts nor albumen have ever been found. The record shows that it was examined five times during the past year, the last time on June 14th, as follows: Passed on rising; sp. gr. 1023; clear yellow; odor normal; urea .022 gramme per c. c. Albumen negative; sugar, negative; sediment, oxalate of lime (few); amorphous urates, vibriones. No disease has been detected in other organs; he is said to have had syphilis when younger but, excepting the state of the vessels, it has not shown itself.

There have been observations published recently pointing to a condition of auto-infection as a cause of periodical manifestations among the insane and including recurrent mania, and it seems particularly applicable to explanation by disease of the kidney where variations in function result in imperfect elimination; but to attribute mental symptoms to Bright's disease upon finding albumen, or even casts, is unscientific and inadmissible until it has been shown that elimination in other respects is deficient. If by quantitative examination the urine is found to contain the excretory products in proportion to the diet and habits of the individual, even if albumen be present, the symptoms of insanity are not results of the kidney change though both may originate from a common cause.

Intermittent mania is in some instances closely allied to explosive states of the cerebral cortex constituting the

so-called masked epilepsy or mental epilepsy,* but in those instances it carries the ear marks of epilepsy and has little in common with the case under consideration. In case No. 603 it should be noted that the first attack followed hard upon prolonged habits of intemperance and his case was considered, no doubt correctly, an alcoholic mania. His recovery was rapid and corresponded probably to the elimination of alcohol from his system. He returned to his work and remained well for three years and, though he doubtless used liquor, he claims to have used it temperately and there is no other evidence. After three years of health he was called upon to lay aside his out-of-door work to nurse his father who had suffered an attack of hemiplegia, and the anxiety, broken sleep and confinement to the sick room brought on his second attack. He had now reached an epoch in his life; the disease slowly progressing in his arterial walls had reached a stage where the brain nutrition was beginning to suffer. Overwork no longer produced physiological fatigue, but nervous exhaustion with irritability and disordered mental processes not unlike a condition sometimes seen after a series of epileptic convulsions.

It is probable that had he been surrounded by more congenial circumstances and had escaped the exciting causes of his first and second attacks his insanity would have been none the less inevitable, but would have been postponed until the declining years of life and then show itself in the form of senile dementia, the disease from which his mother now suffers.

The condition of the arteries should be ascertained and considered in connection in prognosis in, and recovery from insane conditions; and it is especially important to keep this in mind when there have been delusions of persecution and homicidal or suicidal tendencies. Recoveries in such persons with thickened vessels cannot properly be considered permanent; a relapse is sooner or later to be expected and, if the recurrence takes the form of the original attack as is usually the case, great harm may be done to the patient

* Mental Epilepsy. Dr. J. M. Mosher, *Alienist and Neurologist*, 1893.

or the community unless precautions are taken to surround him with instant and proper restraint. Attempts to gauge the vascular system by the condition of the radials and temporals is far from satisfactory; extensive changes have been found post-mortem in the deeper vessels when the radials appeared normal. The retina, from its anatomical peculiarities, can be easily investigated and as its vessels are derived from the ophthalmic branch of the internal carotid after its entrance into the cavity of the cranium it exhibits the condition of the cerebral circulation more accurately than we are able to obtain from other sources. The heart also quickly responds to changes in the vessel walls, the increased work thrown upon this organ leads to hypertrophy and displacement of the apex as certainly as obstruction at the aortic orifice. But before this becomes apparent the increased arterial pressure can be recognized by the sharp ringing note denoting the closure of the aortic valves under increased pressure following the first sound of the heart.

TRAUMATIC EPILEPSY WITH LATE APPEAR- ANCE OF CONVULSIONS.

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The history of this case is briefly as follows:

F. H., age 35 years, farmer, had been a subject of epilepsy for seventeen years, and an inmate of the Buffalo State Hospital for the last five years. His family history is clear from epilepsy or other nervous disorders. When 14 years old he was driving when a heavy plank caught in the wheels, was carried up and struck him a violent blow behind the right ear. He was rendered unconscious and remained so for about 48 hours, with hemorrhage from his nose and right ear, indicating a fracture involving the base of the skull. He did not completely recover from his injury for about two months. For four years he had no symptoms arising from his injury, but then after violent muscular exertion, lifting upon a scale, he had a well marked general convulsion.

During the first two years he had about one convulsion a week, later they became much more frequent. At the time of his admission here he was having from ten to fifteen convulsions a week, was in poor physical condition, very irritable and much disturbed after each attack. Under treatment (bromides and diet) he was much improved, had but one or two convulsions a week and was much better physically and mentally. A very interesting fact was the presence of petit mal in the intervals of remission of his general convulsions. He would stop his work, place his head near the ground, rub his left ear violently and then resume his work. These attacks were very frequent, often a dozen in a day.

On May 6th last, patient entered the status epilepticus having from ten to fifteen convulsions in 24 hours, was obstinately constipated, temperature 105° F. He remained in about the same condition his temperature being on the 12th 106.5° F., on the 13th 107.2° F., until he died.

Post-mortem examination showed no injury to the outer table of the skull, but a distinct depression of the inner table. The depressed portion projected into the cranium about $\frac{1}{8}$ of an inch, was semi-circular and about an inch in diameter. Its location was a little behind and above the junction of the petrous with the mastoid portion of the temporal bone and about midway between this point and the asterion. The meninges were somewhat thickened and adherent to the cranium at this point. This location corresponds to about the middle of the temporo-sphenoidal fissure. At this point a distinct depression was found upon the surface of the cerebrum about two inches in diameter involving the superior and middle temporo-sphenoidal convolutions. The scar involved the whole thickness of the cortex.

Microscopical examination showed the cortex to be a cicatricial mass, the cortical cells small and few in number with an abundant deposit of fibrous tissue closely interlaced about them.

The most noticeable fact in this case is the protracted period between the date of the injury and the appearance of the first convulsion—four years.

Of all cases of epilepsy but a small proportion can be definitely traced to trauma. Of 1,450 cases reported by

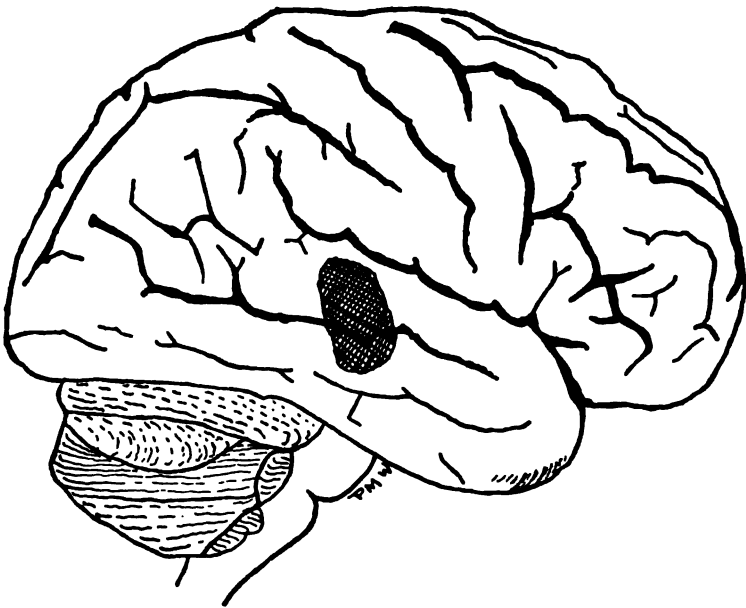
Gowers but 65 cases or .45 per cent could positively be said to be due to this cause. Of these 65 cases, 20 per cent developed convulsions immediately, 33 per cent during the first week and 20 per cent between the first week and the end of a month, making 73 per cent of all cases in which the first convulsion made its appearance during the first month. These figures, however, do not compare very closely with those given by Prof. Gray in "Dercum's System of Nervous Diseases." The length of time elapsing unfortunately is not given in all cases operated upon, but in these in which it is stated convulsions first appeared in 17 per cent immediately, in 14 per cent within one month, in 28 per cent within one year and in 41 per cent after one year. I am inclined to think that the figures given by Gowers are the more accurate as they represent a large series of cases while those of Gray only represent isolated cases that were subjected to operation.

In this case undoubtedly the chief cause was the depressed fracture of the temporal bone and the scar tissue in the temporo-sphenoidal lobe consequent upon the laceration of the brain tissue, but the immediate determining cause should also be taken into account. After the lapse of four years what precipitated the first convulsion? Doubtless the violent exercise in lifting was accountable for this. This increased the intra-cranial tension by determining an excess of blood to the head and in some way transmitted the irritation to the motor areas. By reference to the accompanying diagram which shows the area of degeneration, it will be seen that this area was some distance from the Rolandic area as is frequently the case in traumatic epilepsy. Until we know more about the pathology of epilepsy we cannot say what influence arises from an apparently circumscribed area of degeneration, causing changes so diffuse as to produce general convulsive seizures.

Would surgical interference have been indicated in this case? At the time of the injury although there were said to be no localizing symptoms yet the prolonged unconsciousness was certainly an indication for operative inter-

ference, and would, doubtless, with his perfect family history, saved him from convulsions.

When we take into consideration the lapse of four years before the appearance of convulsions, it is not probable that trephining would have had any influence upon the course of his disease, for the degenerative process must have been complete, the scar tissue resulting from the injury fully formed, so that the morbid influence, whatever it be, arising from this to produce the convulsions would have continued active.



ON THE CARE AND TREATMENT OF THE VIOLENT INSANE.

BY ROBERT G. WALLACE, M. D.,

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Of the many patients admitted to our State hospitals during the year none require for their proper care a deeper knowledge of the science of medicine, a readier appreciation of the numerous methods of therapy, or a more constant exercise of kind and gentle firmness, than do those afflicted with mania. Any plan of treatment in these cases resorted to indiscriminately will prove unsatisfactory, although some cases may recover if only protected from self-injury and exposure.

The diagnosis of acute mania or of mania with frenzy is seldom difficult. For the examining physician the psychical manifestations and motor disturbance; the full rapid pulse; increased respiration; flushed skin and bright eye, with usually a slight rise in temperature, leave little doubt as to the true nature of the trouble. But inasmuch as acute delirium may complicate diseases of the genito-urinary organs, the various periods of pregnancy, Bright's disease, gastro-intestinal and hepatic troubles, diseases of the heart and lungs, and such general affections as tuberculosis, variola, typhoid, erysipelas, and la grippe, (nor should we omit a consideration of that newer concept of scientific thought auto-intoxication), the first question that occurs to the careful examiner is the possible presence of some abnormal condition by relieving which he may benefit or cure the mental trouble.

Home treatment in these cases is surrounded by many difficulties, and it is not surprising that the family physician early exercised the prerogative that properly belongs to him alone and advises that the patient be removed to an institution.

ADMISSION.—Upon his admission to the hospital the officer of the day examines his commitment papers, notes

his height, weight, time of arrival, where he comes from and who accompanied him, together with his actions and general behavior, all of which are entered in the case book with his history. He is then sent to the receiving ward where the junior physician on the service makes a careful physical examination. Care is also taken to note any marks or bruises, and, if possible, a specimen of his urine is obtained for examination. He is then given a hot bath after which he is placed in bed. As a rule the sick room will be found conveniently large and comfortably furnished with the bed so situated as to be easily accessible from either side. Quieted by his bath the patient is usually willing to accept the bowl of hot milk or gruel which the nurse brings him and to which has been added some suitable sedative. Instructions are given for him to receive milk and beef tea alternately each two hours while awake. The physician on his return to the office prepares a clinical chart* of the case. He carefully notes the mental curve and completes the tracing of the disease previous to admission from information received from the medical certificate and from the friends who have accompanied the patient to the hospital. The chart is then sent to the ward where the nurse records the pulse, respiration and temperature.

On the following morning he is taken in charge by the senior physician on the service who, before leaving the office, examines the certificate and past history of the patient. With the information thus obtained, the record already received from his assistant, and the clinical chart on which the night nurse has noted the number of hours' sleep and the morning physical condition, he is in a position to complete the mental examination of the case and prescribe the necessary treatment.

Here it will be interesting to note the change in therapeutic measures from older methods when, as a means of relieving excitement, active manual labor was the routine treatment. To-day we recognize, however valuable out-

* See State Hospitals Bulletin, April, 1896.

door exercise may be in the treatment of chronic forms of mania in acute delirious and in simple acute mania, where the patient will not tolerate the slightest opposition without cursing and shouting or destroying clothes and furniture, that exercise in the open air has no place until convalescence is fairly established. In such cases, rest in bed, absolute quiet and freedom from the interference of sympathizing friends, is of the utmost importance. A careful study of a case of acute mania not only leads to the conclusion that depletion by venesection or purgation does harm, but it strongly contra-indicates the use of all those agents, such as *veratrum viride*, aconite, antimony and iodide of potassium, which have a sedative action on the heart. Those, however, who accept Kirchoff's views that there is in maniacal conditions a red softening of the middle cortical layer, or who agree with the Krafft-Ebing that, in mania, cerebral hyperæmia is a cause and not an effect, may be disposed to employ those remedies, but much better would seem to be the use of such drugs as ergotin and ergotinine where the cerebral effect is obtained without the cardiac depression.

ARTIFICIAL FEEDING.—If a patient takes nourishment freely the most difficult problem of treatment is removed, but, unfortunately, this is seldom the case. He either absolutely refuses his food or what is more frequent takes only a limited amount which is by no means sufficient to compensate for the tissue waste that is going on in his body. Artificial feeding should never be employed if it can possibly be avoided, but if the patient, despite the constant solicitation of his nurses, continues to refuse nourishment, it should not be very long delayed. Of the numerous methods devised for feeding, probably the best is the large œsophageal tube passed by the mouth which is held open by means of a wedge and a smaller tube which is passed by the nose. The latter method, more cleanly and less objectionable to the patient, is used as follows: a rubber tube eighteen or twenty inches long and resembling an elongated Nelaton catheter has attached to one end a funnel or preferably a

Davidson syringe. It is lubricated with vaseline, and, while the nurse holds the patient's head from the pillow, is passed through the nose down to the stomach. A quart of warm milk to which has been added three or four eggs is then injected, the process being repeated morning and night—more frequent feeding being advisable only when the patient takes kindly to the process. If his struggles are severe the tube may curl up at the back of the throat or may enter the larynx; either accident however is quickly observed by a skilled operator. A simple device and one that greatly facilitates the feeding of intractable patients who willfully contract the muscles of the pharynx is to allow a few drachms of fluid to pass through the syringe, and as the effort to swallow is made, the tube will be found to readily follow the muscular contraction. This reflex swallow may also be employed to advantage in many patients who refuse food but who will take fluid through a catheter passed as far as the posterior nares.

The nasal tube and syringe may be utilized to wash out the stomach before the food is given, and it will be found that this procedure favors the acceptance of nourishment. Every effort should be made to induce the patient to accept food without the necessity of tubing. Meat broths, prepared foods, and special preparations of milk and eggs may be given in such quantities as the stomach will retain and at short intervals.

HYDROTHERAPY.—Should the patient be a case of prolonged motor excitement the question of his control becomes an important one. Baths for the relief of the excitement were employed by the priesthood in very ancient times, but never to the extent that marks their modern scientific application. The principal ones are the prolonged hot bath, the hot bath with cold to the head, sitz bath, prolonged cold bath, douches, needle and spray baths, the wet pack, dry pack, hot air and vapor baths. We will describe only the hot bath and wet pack as these are the most useful.

Prolonged immersion in hot water has long been re-

garded as an excellent sedative remedy and is undoubtedly of great therapeutic value, not only in motor excitement but in the insomnia of any form of mental trouble. It may be employed several nights in succession with the happiest results of breaking up the habit of sleeplessness. The temperature of the water should be from 98° F. to 102° F., and the patient immersed to the neck for from twenty minutes to an hour, as the case may require. The addition of cold to the head is of value, but it must be employed with care as fatal syncope may follow.

Packing in a wet sheet is a powerful sedative and will usually control the most violent case. The process is as follows: an ordinary sheet is wet in cold water, partially wrung out and spread over a blanket. The patient stripped of his clothing is then placed on the sheet and completely wrapped up, if necessary adding two or three more blankets. He is then covered up in bed and allowed to remain there for an hour, at the expiration of which time the wrappings are removed, he is doused with a few pails of tepid water, rubbed dry, and returned to bed. This process may be modified with advantage in some cases by substituting a sheet wrung out in hot water instead of cold and dispensing with the tepid douche.

But occasionally cases occur, where hydrotherapy will be found of little value, and where motor excitement still persists even after the employment of drugs to the limit of safety; nor is seclusion to be thought of in these cases, for even with the constant attendance of experienced nurses, the complications incident to exposure are with difficulty avoided. At one time straight jackets, muffs and wristlets were extensively employed to control this form of excitement, but to-day these devices have been done away with and in place of them we employ trained nurses and skilled attendants who, through the exercise of kind and gentle discipline and ever watchful care, have happily demonstrated the inestimable value of non-restraint methods. In surgical cases however, and in those rarer forms of motor excitement with extreme exhaustion, a

protection sheet is at times useful to husband strength and favor recovery.

MATERIA MEDICA.—The frequency with which disturbed patients refuse medicine, or if accepted the delayed absorption and imperfect results that so often follow even large doses, has led in recent years to the employment of those narcotics that may be given hypodermically. Of these the principal ones are the alkaloids of hyoscyamus, opium and duboisia; but since the introduction of the non-restraint system, few drugs have been more abused than hyoscyamus, and yet, if it be employed with care and with due recognition of its sedative powers it will be found productive of great good.

Probably the most reliable preparation of the drug is the amorphous sulphate of hyoscyamine, prepared by Merck of Germany. A standard centesimal solution is made as follows:

R	Sulphate of hyoscyamine.....	1	gram.
	Boric acid.....	$\frac{1}{2}$	"
	Alcohol.....	2	c. c.
	Distilled water.....	100	c. c.

One minim contains $\frac{1}{100}$ of a grain of the sulphate. The dose is two to ten minims, less than two minims being likely to increase rather than diminish excitement. Sleep usually follows in a few minutes after its administration, even in violent cases, and lasts six or seven hours. It is best to commence with the smaller dose, and it should be borne in mind that women are more susceptible to its use than men, and that it is positively contra-indicated in the old and feeble. In chronic male cases doses of from twenty to thirty minims have frequently been given without any ill effects, whereas in females dangerous if not fatal symptoms have been observed after doses of seven minims.

Morphine, however useful it may be in melancholia, when given alone in cases of maniacal excitement is of comparatively little value. Combined with hyoscyamine, however, it forms one of our most valuable hypnotics. The "mixed solution" as it is termed in hospital parlance may

be prepared by adding to the centesimal solution of the sulphate an equal amount of Magendie's solution of morphine. The dose is two to twelve or fifteen minims, the usual dose being seven minims, which equals $\frac{1}{30}$ of a grain of hyoscyamine and $\frac{1}{10}$ of a grain of morphine. It is safer than the hyoscyamine alone, induces sleep as quickly and leaves few after effects of a disagreeable nature. Some physicians prefer sulphate of duboisine which is given in doses of $\frac{1}{10}$ to $\frac{1}{3}$ of a grain, and is almost identical in its effects with hyoscyamine.

Of the more recent sedatives few equal sulfonal in securing a quiet and comfortable night's rest. It is especially useful in weak cases, and is best given in twenty to thirty grain doses at supper time in hot milk or gruel. Dr. Hurd of the Buffalo State Hospital reports favorable results in noisy patients from twenty to thirty grain doses of sulfonal given in a hot solution before breakfast. In strong, violent patients where the motor and mental excitement may continue for weeks or months without cessation, sulfonal in twenty to forty grain doses, morning and night, will be found a reliable sedative.

Almost as valuable as sulfonal is chloralamid in twenty to thirty grain doses. Chlorobrom, a mixture of equal parts of potassium bromide and chloralamid dissolved in water is advised by Dr. Wade as a reliable and lasting hypnotic.

Chloral has of late been less in favor on account of its powerful action on the heart. When given in continued doses, alone or combined with the bromides it invariably produces vascular disturbance with anæmia and tendency to syncope. Combined with bromide of potassium and morphine it is used to produce sleep in many hospitals, and is most valuable where a single night dose is required.

Trional and tetronal have been favorably reported on by Dr. Mabon, the former drug being valuable for its hypnotic and the latter for its sedative properties.

Paraldehyde in drachm doses, either alone or combined with whisky, is frequently used in the treatment of general paresis and also in other forms of motor disturbance.

Hypnol in doses of thirty grains; amylene hydrate ten to thirty minims; methylal, hypnone, butyl-chloral, somnal, and urethan all have their advocates. Bromide of potassium and the bromides of sodium and nickel are valuable in mania and especially so when there is a history of convulsions. Belladonna, conium, cannabis indica and stramonium are now seldom employed, except in combination with other drugs. Ergot or its active principles are employed by some physicians almost to the exclusion of other drugs.

As regards the use of stimulants, in those cases where exhaustion accompanies prolonged motor excitement they frequently have a quieting, and to a certain extent, sedative effect. When the heart begins to fail they should be pushed without regard to motor symptoms. Electricity, inasmuch as it is a stimulant, is of value in excitement only in cases of exhaustion and in the treatment of complications. Massage is used in similar cases and to about the same extent as electricity.

Counter-irritants were much employed by the older physicians and are to-day of value in certain cases. A small capsicum plaster to the back of the neck will relieve cerebral hyperæmia, but if more extensive action is required the applications should be made on the lower extremities.

When we consider the number of recoveries that have followed carbuncles, cellulitis, fractures and pneumonia, the conclusion is irresistible that there is a factor of value in these cases that it would be well to imitate. It must be admitted, however, that beneficial results more frequently follow spontaneous than artificial inflammation.

Hypnotic suggestion as applied to the insane has been disappointing in its results. Of more value is the intimate relation between patient and physician which permits the latter to guide with an unseen hand, but none the less surely, the wavering intellect as day by day it gradually regains strength.

CONVALESCENCE.—Convalescence from acute mania is usually protracted, from mania with delirium rapid and

complete. Perhaps on making rounds some morning the physician finds his patient sitting up in bed with a wondering expression on his face questioning his nurse about his surroundings and commitment of which he remembers nothing. From this point his recovery is rapid. All sedatives are stopped except an occasional sleeping draught at night, and in their place are employed such tonics as iron, arsenic, phosphorus, quinine, and strychnine. The bitter elixir of arsenic and iron, or the elixir calisaya, strychnine and iron gives excellent results. With his returning strength he is soon able to exercise in the open air, assisting the gardener about his duties or working at some other congenial occupation until he fully regains his strength, when he is discharged as recovered and is restored to his friends.

CHRONIC MANIA.—In the consideration of those cases where, after months of untiring care and attention, no improvement is noticed, and also those more frequent and less hopeful ones who were for months or years retained at home by their friends, perhaps no better illustration could be given than is afforded by several cases admitted to this hospital during the past few months. Of these unfortunates one had for years, during the summer months, been kept chained to a tree in the back yard of his home; another had been imprisoned in a room with a strong oak door separating him from the outer world and a grating so arranged that his food and drink could be passed in to him, no one daring to enter; while a third, and perhaps the most inhuman of all these cases, was that of a woman over seventy years of age who for years had been kept in a cage-like apartment where her time was spent in climbing up the sides in vain effort to reach the objects of visual hallucination.

Had these misguided relatives accepted the advice of their physicians or had they understood the true nature of the trouble, that insanity was but a symptom—a manifestation of disease of the brain—requiring treatment as prompt and skilful as one of the infectious fevers, we would not perhaps have to record them to-day as hopeless cases fated

to pass the remaining days of their lives in confinement, when proper care during the first weeks of their illness might have at least relieved, if not entirely cured, their mental alienation.

The general treatment of these cases will include outdoor employment with music and other amusement as a part of their daily life. No less important is the size and general arrangement of the ward in which so much of the patient's time must be spent, and unless this factor in treatment be properly considered the best efforts of the physician will prove of little benefit.

NOTES ON THE THYROID TREATMENT OF INSANITY.

BY T. J. CURRIE, M. D.,
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The following report is based on careful clinical observations of seven patients who received the thyroid treatment during a period varying from eleven to twenty-two days. Of the patients selected, four were cases of acute melancholia; two were in the sub-acute stage of melancholia, and the seventh was a case of acute mania when admitted, but, before treatment was commenced, he was dull and inactive and becoming demented in appearance.

One of the cases of sub-acute melancholia had been in the hospital over twenty months; the other patients had been admitted more recently, but were considered doubtful for recovery. The cases of melancholia were becoming more depressed and indifferent, had many delusions of a varying character, and one had absolutely no desire for food, and had been fed artificially for some time previous to beginning treatment.

The clinical history of several cases is given somewhat in detail, as interesting variations were observed in the physiological effect of the remedy.

The preparation used was the desiccated thyroid prepared by Parke, Davis & Co., which has given good results in all cases, so far as the action of the remedy is concerned, at least.

CASE 1.—E. B., male, age 23, second attack; was previously treated in this hospital and discharged recovered after five months.

When admitted he was a case of acute mania, excited, boisterous, and had delusions of persecution by electricity. Later he became dull and more confused, with dazed and anxious expression of countenance. He occasionally showed a slight improvement in his mental condition for a few days, but always relapsed into the careless, untidy state, and was to all appearance becoming demented, although gaining in weight. Duration of insanity, eight months previous to treatment.

There was prompt reaction to the treatment in this case, which was begun by administering five grains of desiccated thyroids t.i.d., increased to eight grains t.i.d. on the fourth day, and upon the fifth day the temperature was 99.4°, pulse 94, he was brighter, cheerful, and inclined to be mischievous. Later there was marked flushing of the face, congestion of the conjunctiva, and headache was complained of. The tongue was very much furred, and he had considerable nausea and vomiting during two days, but his appetite continued fair. The dose was increased to ten grains t.i.d. on the tenth day, and following that the muscular tremor became general, but was more marked in the extremities.

The treatment was stopped at the end of eighteen days, as all the symptoms noted were intensified, the muscular tremor in particular, was very marked, and there were indications of exhaustion. Temperature, 99.4°; pulse, 123, weak and irregular; respirations, 24.

The patient had nausea and slight vomiting for two days after treatment was stopped. His temperature declined to normal in three days, and he became much brighter and more appreciative mentally; lost seventeen pounds in weight.

He developed a very hearty appetite, gained rapidly in weight and strength, was bright, cheerful, active and inclined to be mischievous, but not in any way violent. At present, three months after treatment, he is quiet, cheerful, rational in conversation and industrious, and is regarded as favorable for complete recovery.

CASE 2.—W. H. C., male, age 27, was depressed and deluded when admitted. He remained in a melancholy state, was at times disturbed and violent, often impudent in speech and manner, and always under the influence of delusions of a sexual character. He became gradually more irritable and untidy, and was apparently growing demented. Duration of insanity two years.

He received the thyroid treatment in November, 1895. It was

discontinued before the full reaction was secured, as there were signs of cardiac failure. Following the treatment he became considerably brighter and more appreciative, mentally, for a time, but after two months began to relapse into the former apathetic and confused state.

The second treatment was commenced February 27th, 1896. The patient was then fairly nourished. Temperature 97° , pulse 53, irregular in force and rhythm. On the second day there was slight flushing of face and dilatation of pupils, with furred tongue and constipation, and rise of temperature to 99° , without corresponding increase in pulse rate. Following this the temperature ranged from 97.4° to 99° until the ninth day of treatment, when it remained at 99° until the twelfth day. The pulse at this time was 78 to 90, intermittent, full, and stronger than before. The face was flushed, eyes congested, tongue clean, appetite good, bowels constipated, relieved by *Ol. Ricini*. The patient was brighter and more cheerful. From the twelfth to the fourteenth day, when treatment was stopped, the temperature was about normal, although he was then receiving sixteen grains of the thyroid *t.i.d.*; the pulse was 70 to 80 and of fair strength, but continued intermittent, and became irregular in force and rhythm. The patient lost fifteen pounds in weight, and there was marked muscular weakness, emaciation and anæmia. Given tonics and a generous diet, and his physical condition improved rapidly. Three months after the treatment, he is in good physical health and much improved mentally, but cannot yet be reckoned as a recovery.

CASE 3.—M. O'C., male, age 20, family history and habits good, duration of insanity four months, diagnosis acute melancholia. When admitted he was depressed, confused and suspicious, and expressed the delusion that poison was placed in his food. He became inactive, more depressed, and gradually settled into a stuporous condition; would not take sufficient food and was fed artificially for six weeks, without the slightest protest or resistance on his part. Treatment was begun by administration of eight grains of desiccated thyroid in capsules, *t. i. d.* At the time he was fairly nourished but anæmic, heart, lungs and urine normal, pupils widely dilated and did not react normally to light.

Given eight grains thyroid four times a day after the fourth day. On the eighth day of treatment there was slight temperature reaction; pulse 70, face flushed, pupils dilated but react more readily to light, skin dry and warm, tongue furred, has obstinate constipation which is relieved by *Ol. Ricini*, excretion of urine increased to about three times the normal quantity. The dose of thyroid was increased to ten grains four times a day on the tenth day, and treatment was stopped at the end of the twelfth day. The patient was becoming very restless, pulse 96, action of heart weak and irregular, and cardiac stimulation was resorted to.

On the following day the temperature was 99.6°, pulse 100, irregular in force and rhythm, respiration 24. The patient resisted tube feeding and showed considerable twitching of muscles of extremities, and tremor of tongue and facial muscles. Lost fourteen pounds in weight. He became considerably brighter, answered questions readily, began to eat voluntarily, and gained in flesh steadily for three weeks. There was only transient mental improvement in this case, and at present he is again melancholy and deluded and has to be fed artificially, as he has absolutely no desire for food.

In this case the temperature rose gradually from 97° until at the end of two weeks it reached 99.6°, and then declined to normal in three days.

The fourth case was similar to the one reported above. A man 22 years old, who had been insane about four months, greatly depressed and gradually becoming more stupid and inactive. The treatment gave prompt reaction, and there was transitory alleviation of the depression, but he became dull and apathetic again within ten days after the treatment was discontinued. Although the patient was fairly strong and well nourished when the administration of thyroid was commenced, and his heart, lungs and kidneys were in a healthy condition, there was such marked motor disturbance, emaciation and exhaustion at the end of eleven days' treatment, and the mental improvement was so slight and of such short duration that we did not consider it advisable to resume the treatment in this case for the present.

CASE 5.—J. C., male, age 19. Family history good as far as ascertained; cause of insanity, self-abuse; duration of insanity five months; diagnosis, acute melancholia. On admission he was depressed and confused; afterward he became agitated, expressed many confused delusions of a melancholy nature, had sensory illusions, and imagined that snakes were crawling through his body.

Later he was more intensely depressed, suspicious of food and it was necessary to feed him artificially for a time. At the time treatment was commenced he was depressed and inactive, but eating voluntarily and gaining in weight.

In this case the temperature rose gradually from 97° until the eighth day, when it reached 99.4°, pulse 106, regular, soft and compressible. The patient had become very restless, talkative and profane, noisy at night and disposed to annoy other patients in a mischievous way. His face was flushed, eyes very red and conjunctivæ congested. Surface of body warm and moist; quantity of urine increased, and it contained excess of urates. Salivary secretion greatly increased, and patient is constantly expectorating. His temperature ranged from 98.2° to 99° until the thirteenth day, when it rose to 100° in the evening, with pulse 130, irregular in force and rhythm, and com-

pressible, Nausea was complained of on the ninth day and the patient vomited twice. There has been obstinate constipation which is relieved by administration of *Ol. Ricini* every third day. He became excited, noisy, very profane and abusive, masturbating frequently, and required close watching to keep him in bed. Although he was receiving sixteen grains thyroid t. i. d., the temperature declined to 98.2° on the twenty-second day, when the thyroid was discontinued. He remained in an excited state, with profuse perspiration, increased secretion of salivary glands, marked thirst and fair appetite until the seventeenth day, when he again complained of nausea, and vomited several times. After that his appetite was poor for three or four days when he again began to take food readily. The tongue, which at first was thick and much furred, became brown and dry in the third week, and the patient was weaker, nervous and restless, pulse 110—124, irregular, compressible and frequently intermittent. Skin pale, surface of body cool and moist until the twentieth day, when he became brighter with improved appetite, flushed face, warm skin and profuse perspiration. Loss in weight was 22 pounds.

After the treatment he was weak, muscles soft and flabby, and there was marked anæmia. At present, a week later, he has good appetite, is gaining in flesh and strength; is cheerful, considerably brighter, and talks readily, but is still childish and confused in speech.

CASE 6.—R. C. B., male, age 19, sub-acute melancholia of one year's duration. He was employed as a drug clerk, and, having become dull and inattentive to business, was discharged, and following that became depressed and more confused. After admission to the hospital he became very despondent, and was tormented by many gloomy delusions of a religious character.

Treatment was commenced by administration of eight grains thyroid t. i. d. No marked reaction until fifth day, when the patient was restless, a little brighter, complained of nausea and headache, and vomited in the evening. During the four following days he had slight nausea and headache, face flushed, pupils dilated, skin warm and moist, with profuse perspiration at times, and considerable thirst, but appetite was poor. The dose of thyroid was increased to ten grains on the sixth day and to sixteen grains t. i. d. on the tenth day. On the eleventh day the temperature rose to 99.4° , pulse 108, respiration, 20. The temperature remained about 99° , until the fourteenth day when it fell to 98° and remained about normal until the end of treatment, although the dose of thyroid was increased to twenty-four grains t. i. d. on the eighteenth day. The patient became considerably brighter and more cheerful after the second week of treatment, and, although he occasionally complained of nausea and headache, his appetite was fair until the twentieth day, when he had very poor appetite until the treatment was discontinued on the twenty second day. There was

obstinate constipation during the treatment, which was frequently relieved by cathartics. The patient was very thirsty, and there was considerable sweating and increased quantity of urine; lost 20 pounds in weight.

A week later he is bright and cheerful, gaining in weight, and recovering rapidly from the emaciation and anæmia incident to the treatment.

CASE 7.—G. J. V., male, age 42, a typical case of acute melancholia of five months duration, with strong hereditary tendency, as the father was insane and committed suicide. About a week after admission the patient became a little brighter, but soon became more intensely depressed than before.

At the beginning of treatment his temperature was 97.6°. There was prompt reaction, and on the sixth day the patient was very restless, talked readily; there was dilatation of pupils, flushing of face, rhythmical twitching of muscles of arms and legs; temperature 99, pulse 100. In the four following days, temperature 98.2 to 98.8; patient talked in an abrupt, irritable way, had aural and visual hallucinations, and when alone talked in a complaining way with imaginary people. Temperature 99 on the eleventh day; treatment discontinued on the twelfth day, as he was becoming weak and emaciated, with very irregular pulse, and refused food.

His temperature declined gradually until four days after thyroid was stopped, when it was 97°. After that it became about normal. He continued to talk in a loud, angry tone, addressing imaginary people, was restless and excitable, but the tremor of tongue and twitching of muscles of arms and legs gradually disappeared. Loss in weight 20 pounds.

He received *Tr. Digitalis*, \mathfrak{m} , v. t.i.d. after the sixth day of treatment, as it was indicated on account of the weak, irregular heart action. Constipation was present in this as in the other cases.

He is at present becoming depressed, quiet and indifferent again, receives tonics, but appetite does not improve, and there is no apparent improvement in his mental condition.

Administration of Thyroid.—The desiccated thyroid was given in capsules, as the taste of the preparation is disagreeable and even nauseating to most patients. In one case, in which artificial feeding was necessary, the thyroid was stirred in the liquid food.

The initial doses were five or eight grains t. i. d., and this was gradually increased until sixteen grains t. i. d. were given, and in one case the patient received 72 grains per day for several days, without the development of any alarming symptoms. One patient showed unusual sus-

ceptibility to the remedy, and became rapidly emaciated and exhausted, although the maximum dose was only ten grains t. i. d. One patient who had fair appetite was suspicious, and would not swallow the capsules unless carefully watched.

In two cases where there was prompt reaction to medium doses of thyroid, followed by fall of temperature, the administration was continued and followed by a second reaction and slightly higher temperature, with beneficial results. In cases where the reaction was quickly established, and the temperature rapidly subsided to normal or below, the further administration of the remedy was followed by unfavorable symptoms, as the pulse became weak, irregular and rapid, and the toxic effect of the remedy was shown very quickly. It is advisable to stop treatment when that condition occurs, and resort to tonics and a generous supply of easily digested food.

Duration Previous to Treatment.—The duration of insanity in these cases ranged from four months in a case of acute melancholia, to two years in a case of sub-acute melancholia. The average period was over nine months.

Loss in Weight.—There was a marked loss in bodily weight in all the cases treated. This amounted to twenty pounds in each of three cases, and from fourteen to twenty-two pounds in the other cases. The digestive derangement which occurs during the administration of thyroid, the consequent loss of appetite and the increased elimination of water and nitrogenous substances, accounts to a large extent for the rapid waste of the tissues. In this process of artificial emaciation the muscular system appears to suffer most severely; then the subcutaneous fat of the body, and the blood.

Temperature.—The temperature was taken in the axilla in all cases, and showed a rise of from one and one-half to three degrees. In most cases there was a slight rise in temperature each day for a period varying from seven to fourteen days, then became irregular with a tendency to decline to normal. Those cases in which the temperature

rise was regular and followed by a gradual decline, showed the greatest improvement following the treatment.

Pulse.—The pulse increased in frequency and usually became weak and irregular, and in some cases quite rapid when the full effect of the remedy was reached.

Respiration.—The respiratory rate was increased, usually 22 to 24 per minute.

Digestive System.—The tongue was heavily coated in most cases at first; later it became dry and brown in some cases, clean and red in others.

There was nausea, which was usually slight, in nearly all cases during the first week, and again toward the end of treatment. Vomiting occurred in three cases and impaired appetite in all cases, at some time during course of treatment. Unusual thirst was a prominent symptom in all cases. All the patients were constipated during the treatment, and it was necessary to give cathartics regularly to secure action of the bowels.

Nervous System.—Headache was complained of in most cases; and two patients had neuralgic pains in the lumbar region, and shooting pains in the legs. There was tremor of tongue and facial muscles in two cases, and spasmodic twitching of the muscles of the extremities of varying severity in most cases. The pupils were dilated in several cases during the early part of the treatment, and did not react normally to the light, but became normal afterward.

Excretion.—Quantity of urine increased in all cases during first week, in one patient to three times the usual amount, and elimination of urea increased. Profuse perspiration in two cases, especially marked following any exertion on the part of the patient.

Muscular System.—Marked waste of muscular tissue in all cases, the muscles becoming soft and flabby.

Motor restlessness was present and increased with the rise in temperature.

The cases of melancholia became brighter, more cheerful and appreciative. Three patients relapsed into the old despondent condition very soon after treatment was dis-

continued. Two patients remain in a favorable mental condition three months after treatment, and will probably recover. The others are very much improved, but the prognosis is still very uncertain, as they have only been under observation about a week since the treatment was discontinued.

The results have not been encouraging in the treatment of acute cases of melancholia. The prolonged cases of melancholia and mania who were becoming very doubtful for recovery have shown better results, so far.

Twenty-two cases were treated last November, and a report by the Willard State Hospital staff was published in the January number of the BULLETIN. Many of the patients were cases of terminal dementia, and all were in an unfavorable condition, so far as any prospect of recovery was concerned. One patient who was considerably improved mentally and physically, following treatment, relapsed after two months, and again received treatment with a still further improvement in his mental condition, but so far has not recovered. A case of sub-acute mania, who was very violent and troublesome before treatment, is now quiet, cheerful and fairly industrious. Another patient, a case of terminal dementia, who was somewhat obese, became stronger and more active physically, for several months after treatment. The other cases are not improved to any appreciable degree.

I am indebted to Dr. J. W. Russell, Medical Intern, for careful daily observations in several of the above cases while they were under treatment.

* * *

The editorial committee desires to record an acknowledgment of the receipt of Dr. Van Gieson's manuscript, as a continuance of his dissertation upon the projected scope of the work of the State Pathological Institute, and continued to the present number. The committee regrets the necessity of deferring its publication; and as its length and importance deserves especial recognition, it will constitute issue number four of the BULLETIN entire.

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REMARKS ON THE SCOPE AND ORGANIZATION OF THE PATHOLOGICAL INSTITUTE OF THE NEW YORK STATE HOSPITALS.

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PART II.*

THE TOXIC BASIS OF NEURAL DISEASES.

SECTION I.

REMARKS ON THE RELATION OF THE AUTO-INTOXICATIONS TO NEURAL DISEASE.

Gentlemen.—At a previous meeting it was my privilege to indicate that certain factors are at hand for the creation of a new epoch in the evolution of the pathogenesis of nervous and mental diseases; especially of the latter.

The first and most important of these factors is the precise and definite status which the anatomy of the nervous system attained through the investigations of the past decade by the Golgi methods; the establishment of the neuron theory in particular leads to a definite understanding of the pathology and physiology of the nervous system.

A second great factor in this new epoch of neuropathology is the application of the modern doctrine of cytology

* The continuation of an informal address (STATE HOSPITALS BULLETIN, Vol. I, No. 2) to a conference of the Medical and General Superintendents of the State Hospitals and the State Commission in Lunacy on the character of the future work of the Pathological Institute when completely equipped and organized.

and its technical methods of research to the investigation of the problems in nervous and mental diseases.

A third factor is a realization of the absolute necessity of correlating the nervous system with other organs and tissues in the body in studying the operation of the fundamental and general somatic pathological processes in the nervous system.

However obvious or trite the statement of this third factor may appear, it is nevertheless true that much of the present obscurity in the pathogenesis of nervous and, especially, of mental diseases is largely to be explained by the very simple fact that the brain and the rest of the nervous system have been studied altogether too much as something apart from the rest of the body—as something beyond the jurisdiction of the laws of the great fundamental pathological processes which operate on the whole organism. The present status of the pathology of mental diseases is, indeed, a very good example of how narrow the scope of specialized study in neuropathology in general has grown.

This has come to pass very largely by not correlating and homologizing the nervous system with other tissues and organs in the body in the study of the effects of the few fundamental pathological processes which underlie mental and nervous, as well as disease in general. It is not too much to say deliberately that we know very little indeed of the complete story of the pathogenesis of the various insanities. While we are aware of some of the coarser and grosser terminal results of many of the pathological processes which lie parallel with insanity, the physical basis of mental diseases and their causation is, on the whole, practically a mystery.

Furthermore, at our last meeting, I indicated the necessity of establishing the Pathological Institute on a broad, comprehensive basis, so that by correlating all of the sciences related to neuropathology, and above all, by the uniform study of mental and nervous diseases in the broad light of general pathological anatomy, we might not merely describe clearly and accurately changes in the

nervous system, but also understand their significance and interpretation.

Finally I called your attention to the fact, that the progress of the past ten years in bacteriology and physiological chemistry have gone far toward demonstrating that the great majority, in fact, if not most, of the processes of disease in general are due to toxic substances in one form or another.

It is my profound conviction that in the course of time, the application of this toxic theory of disease to the nervous system is destined to clear away much of the present vagueness and mystery of the causative agents and pathogenesis of mental diseases.

The brain is involved like any other organ of the body, in these general toxic or somatic diseases, and many of the insanities (excluding those of psychic origin) are but the expression of the later disturbance of the functions of the brain dependent upon changes in the nerve cells produced by the action of toxic substances.

The relation of the dependence of changes in the nervous system upon general somatic diseases is often thoroughly masked; there may be a long lapse of time between the occurrence of the general body disease, and the appearance of the mental or nervous symptoms due to the damage wrought on the brain, by the toxic substances associated with the acute general illness. The lapse of time may be so long that the relation between the two events is lost track of.

Then, too often have the mental or nervous symptoms been made to appear as due to a pathological process originating *de novo* in the nervous system, or as an independent, *sui generis* disease process in the nervous system.

In other cases of neural diseases the general somatic toxic factors act in an intermittent (epilepsy) or chronic manner (tabes melancholia); these toxic factors—auto-intoxications for example—operate slowly, insidiously and persistently. In such instances, associated with chronic parenchymatous degeneration of the nervous system, these

somatic causal factors are generally most subtle, unapparent and unobtrusive.

Then again the tendency has been to regard the pathological processes in the nervous system as something peculiar to and limited to the neural tissues and as independent of the few great primary pathological processes which alike underlie all forms of disease in all parts of the body.

For our purposes, I may divide the pathogenic toxic substances into five groups, viz.:

- (1) Auto-toxic Substances;
- (2) Bacterial Toxines;
- (3) Combinations of 1 and 2;
- (4) Extrinsic Poisons; and
- (5) Protozoal Poisons.

Certain general remarks on this classification of pathogenic poisons are necessary before proceeding with the subject of auto-poisons in neural diseases.

Protozoal poisons are only mentioned in this list and can not be considered to any extent in the general text, for too little is known about them or their pathogenic action on the body. Beyond malaria the diseases associated with protozoa have not even been identified.

Fungus poisons as a class have been omitted from the list, for it is questionable if they appertain to any extent to the toxic basis of neural diseases.

Having apparently quite uniformly a local habitat in the skin or elsewhere in the body (as in actinomycosis of the lungs), unless the fungi themselves are composed of powerful poisons (which is not known to be the case), or produce powerful analytical poisons by splitting up the tissues which they infest, it is improbable that fungus poisons contribute much in the toxic basis of neural or general body diseases. Clinical observations of the few known fungous diseases also bear out such an opinion.

With protozoal poisons the case is quite different. In the one well known manifestation of protozoal poison,

malaria, there are decided expressions of a participation of the nervous system in the general poisoning of the body.

We do not know as yet how many congeners of malaria there may be. If protozoa are responsible for small-pox, (syphilis?) and the exanthem group, a suspicion which I strongly entertain, although merely on the slender tenure of elimination of other classes of poison, the share of protozoal poisons in the toxic basis of neural disease is profoundly important.

That the exanthemata are associated with poisons is certain. Clinical observation shows most decided poisoning of the nervous system. The exanthemata as a group work much damage on the nervous system which by all analogy with other poisons, as will be seen later in this text, ought to be expressed in acute parenchymatous degeneration of the nervous system.

In the case of small-pox for example, there are a variety of permanent sequelæ of the nervous system which indicate that the poison may be so severe as to cause an acute degeneration of the nervous system of a more or less destructive determination.

Since the poisons of the exanthemata can not be identified with bacterial, extrinsic or fungus or auto-poisons, and since it is justifiable in science to accept the simplest hypothesis which will explain the most facts, the theory of the protozoal origin of the exanthemata at the present seems thrust upon us.

The question as to what extent the poisons of protozoal diseases are due to the synthetic compounds composing the protozoa themselves, or to the analytical substances which are created out of the tissues by the destructive action of the protozoa, is at present indeterminable.

While recognizing the possibility of pathogenic poisons from animal parasites of the body, these poisons as a group have been omitted from this classification, for I do not believe that they play any consequential rôle in the toxic production of neural diseases.

If animal parasites excrete poisonous substances or create

secondary analytical toxic products out of the tissues they infest, a class of pathogenic parasitic poisons should be recognized.

If, on the other hand, animal parasites damage an organ so that its chemical functions are interfered with, and a poisoning results, this should be ascribed to an auto-toxic substance and not a parasital poison.

Various combinations of the individual members of this group of poisons other than class (3) are theoretically indicated, for instance, association together of the poisons in groups (1) and (5). Such combinations are omitted from this classification, for their consideration would obviously be premature in the present indefinite state of knowledge of the confines of these individual groups of poisons.

We know enough, however, of the action of bacterial toxæmias to be sure that they must frequently concomitantly engender auto-toxic substances. Hence the third class of poisons is a practical one and has a more or less definite basis for its existence.

The first group of these poisons (auto-toxic) merits much consideration because it will probably come ere long to be recognized as a factor of great importance in the production of mental and nervous diseases. As yet, however, we are but on the threshold of our knowledge of auto-intoxications; only comparatively recently have a number of diseases been wrested from the mysterious domain of the old humoral doctrine of disease and placed in the auto-toxic category; and undoubtedly many more obscure diseases, especially of the nervous system, are to be added to the list.

It is more appropriate at present to indicate the confines of auto-poisons as a separate group than to attempt a definition of auto-intoxication. It would seem comparatively simple at first glance to define the auto-intoxications from other forms of poisoning, by saying that this group of diseases is due to the action of poisons created within the body by the somatic chemical agencies. But all forms of disease are the parallel expression of changed or per-

verted chemical processes of the somatic cells or of chemico-morphological changes in these cells, and this qualification of auto-intoxications does not clearly individualize them from the agency of other groups of poison.

The action of the chemical forces of the body are often most intimately associated with, or modified by, agencies other than those residing exclusively in the tissues themselves, both in health and disease, especially the latter.

It is, therefore, very difficult to dissociate the agencies residing exclusively in the body tissues from extrinsic or other factors in the production of auto-poisons. For instance, the difficulty of determining the boundary line between bacterial poisons and true auto-poisons presents itself.

Bacterial poisons have a dual nature. There is the powerful synthetic poison of which their cell bodies are largely composed, and, secondly, the analytical toxic substances which are created by their destructive action on the tissues which they occupy. While the toxicity of these secondary products of bacterial action on the tissues is not as well known as that of the primary poisons composing the bacteria, such secondary bacterial toxins are not to be included in the true auto-poisons responsible for auto-intoxications, but are to be distinctly relegated to the class of bacterial poisons.

The same distinction is to be made with the secondary or analytical products of protozoal poisoning of the body. The secondary products of the action of protozoa whatever their toxic value may be,* are in no wise to be considered as true auto-toxic substances.

Nor is the absorption of these analytical poisons of bacterial and protozoal action on the tissues to be termed as secondary auto-intoxication. Such secondary products are always to be distinctly classed with their causative agents as bacterial or protozoal poisons.

* In malaria the secondary toxic products induced in the blood by the action of the hæmatozoa would appear to be the predominating toxic agents rather than the substances which compose the bodies of the hæmatozoa.

In the gastro-intestinal tract the distinction between true auto-toxic substances and bacterial toxins is still more difficult. This is a common meeting ground for both sets of poisons in both health and disease.

In the first place, the normal physiological rôle of bacteria in the process of digestion in the gut is apparently attended with a production of toxic agents. The bacteria take part in reducing the ingested food into analytical compounds for absorption, and in these *normal* processes of digestion and the putrefaction attending the formation of fæces, they give rise to certain toxic by-products.

But the toxic properties of bacterial analytical products of food in alimentation are only *latent*, for such toxic products are nullified or transformed into useful substances in the process of absorption, probably especially in hepatic circulation.

Hence, the toxicity of these products becomes *potential* only for the body when there is some interference with the function of those organs whose duty is to destroy or transform these latent toxic substances into innocuous or useful nutrient compounds. Thus, while these analytical digestive or putrefactive products in the gut are really bacterial poisons, they are *habitual normal constituents of the body*, and are not potential poisons unless absorbed by some error in the functions of the organs ordained to dispose of these latent poisons.

I would, therefore, call these poisons, while *latent*, bacterial toxins, but when they become *potential* and gain access to the circulation through errors in the process of absorption, they are to be termed *auto-toxic substances*. This is entirely consistent with the group of auto-intoxications due to the disturbance of the function of an organ with or without anatomical changes, and includes such gastro-intestinal auto-intoxications in that group.

Secondly, while the distinction between normal and pathological action of bacteria in digestion and putrefaction in the gut is most difficult to define, the poisons attending the *pathological action* of foreign or normal bacterial denizens

of the gut (*bacterium coli commune*), when potential, should not be included in the auto-intoxicants but relegated to the bacterial toxins.

Thirdly, there are purely chemical digestive processes in alimentation entirely dissociated from the action of bacteria. If these processes be attended by the formation of toxic products, when such products become potential poisons, by departures from the normal process of absorption they constitute true auto-poisons.

The question of the relation of certain disordered conditions of the blood to auto-intoxications must be dismissed with the intimation that there is very probably a group of hæmic affections which is the direct result of the entrance into the circulation of auto-toxic substances.

In this attempt to indicate the limitations of auto-poisons, the deprivation of the body of some chemical substance necessary for the equation of life must also be considered. This practically induces a resultant interference with the general body chemistry, which I would term *secondary auto-intoxication*. For instance, if oxygen be withheld from the body this may be primarily the cause of death, but it must also be associated with a secondary form of auto-intoxication. Or, for example, for the sake of argument, let us suppose in thyropravia that some necessary chemical constituent is removed from the body. A secondary or indirect form of auto-intoxication would then result from the disturbances in the chemical re-actions in the body dependent upon this removed material. Starvation might be regarded as a similar illustration of secondary or indirect auto-intoxication.

The question is also pertinent if what is meant by the phrase "disturbances of nutrition" as a factor of disease is not made clearer by considering that many of such disturbances are in part at least forms of auto-intoxications. "Disturbances of nutrition" must imply modified or abnormal changes in the body cells and auto-poisons suggest themselves as agents which would very often cause such cellular chemical changes.

I venture to believe that *vulnerability* of the body to disease is partially to be explained by assuming that it is not infrequently due to the effect of hardly measurable persistent auto-poisons. In this case the poisons are so mild in severity as not to elicit any apparently tangible clinical symptoms, but they act so insidiously and persistently on the general body cells, especially the blood and nervous system, that nevertheless a form of auto-intoxication is induced which directly interferes with the defences of the body against (bacterial) diseases.

Qualified by the preceding remarks, as a tentative definition of auto-intoxications, I would say that the primary intoxications are due to the action of poisons newly formed or retained* within the body by the purely somatic chemical agencies, and that secondary auto-intoxications are due to the action of poisons which result from the deprivation of the body of some indispensable chemical constituent.

Aside from direct evidence and guided by the process of exclusion of affections falling in groups 2, 3, 4 and 5, many examples of mental diseases and many obscure nervous diseases must be ascribed to the operation of auto-toxic substances. Unfortunately at present it is only by the analogy and by the exclusion of the action of well-known classes of toxic substances that in many cases we can decide upon the auto-toxic nature of the poison concerned in the induction of many obscure general affections with special manifestations of dependent neural lesions. For the investigation of the nature of poisons of the auto-toxic group involves a technique more subtle and difficult than is necessary in the study of any other class of poisons.

It is only through the most refined analysis of physiological chemistry linked with cautious and extended animal experimentation that we can slowly feel the way along toward the ultimate explanation of the auto-toxic group of diseases. Thus while, largely by mere inference, one or

* Retained poisons include the transformation of latent into potential poisons in the gastro-intestinal tract or elsewhere in the body.

another of the general somatic diseases or mental and nervous affections may be placed in the category of the auto-intoxications the nature of these auto-poisons, whence they arise and the conditions that lead to their production are practically almost entirely unknown.

When it is remembered that the whole animal body is composed of the most complex chemical compounds, which are incessantly undergoing new aggregations and segregations; when one recalls the complex chemical elaboration of the secretions, the digestive processes of the alimentary canal, the chemistry of general tissue metabolism and the chemical processes attending the elimination of waste products from the body he realizes vividly the abundant and constant opportunity which the living body affords under various disturbances for the occurrence of auto-intoxications. The dividing line between the harmless derivate of albumen and the severely poisonous tox-albumen is certainly very often most subtle. Apparently a very slight change in the molecular structure of a useful body proteid may cause a transformation to a very severe tox-albumen. It is not strange in all of this complicated chemistry of the body, that the mechanism goes astray and either *abnormal poisonous chemical compounds* are developed, or poisons *normally elaborated in the body* are not nullified because of derangement of the organs whose function appears to be largely if not wholly for that purpose (liver, thyroid gland), or, by some failure of the eliminative organs, that *the retention within the body of normal physiological products of waste* assumes such proportions as to become poisonous.

The profound conviction already expressed that very many examples of mental and not a few instances of nervous disease are caused by the action of auto-toxines on the nervous system, whether of acute, sub-acute, intermittent, or chronic exhibition, is based upon my studies of the past four years of the cytologic changes on the nerve cells associated with poisons generically. This belief then is founded principally on a morphological basis gained by the following course of studies.

At first the cytologic lesions induced in the ganglion cells by the exhibition of well known poisons of the *extrinsic group* such as *arsenic, lead, mercury and alcohol*, the action of which could be controlled and directly governed in animals, were carefully observed with the result of finding that these lesions were essentially the same for all of these poisons and were phases of an acute parenchymatous degeneration of the nervous system.

Then similar studies of the minute changes in the internal structure of the nerve cell in *bacterial toxæmias* such as typhoid fever and diphtheria showed that the neural cellular lesions were essentially of the same type as those observed from the preceding set of poisons.

Moreover extensive cyto-pathological studies of the nerve cells in *experimental and human rabies* showed again practically the same set of cellular lesions identical with those due to extrinsic and bacterial poisons, namely, phases of an *acute parenchymatous degeneration of greater or less quantitative or topographical distribution in the nervous system*. (Plate I).

These morphological observations of the uniform character of the ganglion cell changes, produced by the action of poisons of such different natures, prompted the inference that the action of poisons of the extrinsic and bacterial group with certain restriction to be mentioned later, all produced the same result in the nervous system as elsewhere in the body; namely, parenchymatous degeneration; of an acute type corresponding with the acute or intense action of a poison, and of the chronic type of parenchymatous degeneration when associated with the gradual, intermittent, or persistent exhibition of a poison of a milder degree of intensity.

It seemed therefore while different *phases* of degeneration of the nerve cells attended the action of several members of the different groups of poisons in the above mentioned observations, that these cell changes were not evidences of individual or distinct pathological process but manifestations of the same thing,—a single, great, broad

fundamental pathological process—acute parenchymatous degeneration of the nervous system.

It appeared then from these observations that two great groups of poisons, the bacterial and extrinsic classes, in the initial stages of their action on the nervous system were manifested by the same fundamental pathological process of acute degeneration, which was in harmony with the fact that this same pathological process is elicited by the action of these same poisons in other organs in the body as well as the nervous system. This led not only to acceptance of the inference that acute parenchymatous degeneration is the expression of the action of poisons in the nervous system as well as in the body universally but also that the converse of this proposition—with certain qualifications,—is also true.

These qualifications are that other factors in the production of disease than toxic agents must be taken into consideration and excepted in stating the converse of the proposition that poisons generically induce acute (or chronic) parenchymatous degeneration of the nervous system. There are besides toxic agents certain traumatic and mechanical factors in the production of acute or chronic parenchymatous degeneration of the nervous system. If there be certain mechanical disturbances in the nutrient supply of the ganglion cell or certain mechanical interferences in its metabolism, parenchymatous degeneration results just as well as in the action of toxic substances. For instance, if the blood supply be cut off from a mass of ganglion cells they undergo changes identical with those in the process of acute parenchymatous degeneration.

Hence, excluding certain traumatic or purely mechanical or nutritive factors in the induction of disease, I am led to accept the belief that acute (or chronic) parenchymatous degeneration of the nervous system as elsewhere in diseases of the body at large, postulates the action of a poison and also the belief in the value of a *posteriori* reasoning from the effect of acute or chronic parenchymatous degeneration of the nervous system to the cause residing in a poison or poisons of one form or another.

Given, therefore, acute (or chronic) parenchymatous degeneration of the nervous system, as shown in Plates I and II, the action of a poison is indicated. But since all poisons seem to act alike on the cell, the poison can not be identified, and we are justified in saying that this morphological evidence of degeneration alone points to the action of a poison only in the generic sense.

Thus in any acute neural disease, or in the involvement of the nervous system in an acute general illness, even of unknown causation or in the chronic affection of the nervous system left behind months or years after these two conditions, when *acute parenchymatous degeneration* or its *results* are found, the imprint of this great extensive pathological process on the ganglion cell, indicates the action of toxic forces as plainly as the marks on the rocks show the glacial action.

Parenchymatous degeneration of the nervous system, then, especially the acute variety, although the distinction between the acute and chronic forms in relation to toxic agents corresponds only to differences in the manner and duration of exhibition of the poisons, may be considered as a reliable clue to the action of a poison. This clue is also of value, even if the results of this cellular degeneration of the nervous system are observed months or years after the acute primary poisoning of the nervous system when the dependence of a chronic mental disease on this antecedent condition has been overlooked.

While little or nothing may be known about the nature or source of subtle and seemingly intangible pathogenic poisons, beyond suspicions of their existence from the clinical history, nevertheless existence in the body of these poisons may be postulated and their causal relation to the neural clinical manifestations may be determined by the morphological changes of parenchymatous degeneration recorded in the nerve cell by their toxic action.

Furthermore, in other mental or nervous diseases, wherein the source or nature of a poison is so artfully concealed from clinical or other scrutiny that we

have not as yet arrived at even definite suspicions of a toxic agency, we shall, nevertheless, be enabled through this morphological line of evidence, to demonstrate the presence of a poison or poisons as the causal factor of the disease, and in a great measure explain the reason of the clinical manifestations.

These neurocytological investigations were then extended from the field of extrinsic and bacterial poisons to *uræmia*, *sun-stroke* and *experimental thyropravia*. This latter disease manifests such a close clinical resemblance to a severe and fatal form of tetany, that an understanding of the former is most valuable in interpreting, in a general way, the *modus operandi* of the poison in the latter disease.

From the above outlined studies leading to the interpretation of acute parenchymatous degeneration of the nervous system as an index to the action of poisons, upon discovering *this acute parenchymatous degeneration* in one or another of its phases in the nervous system *in these three diseases*, I knew that such nerve cell changes (like those in Plate I) were the handiwork of some unknown poison or poisons. Having established in this way that the existence of poisons was responsible for these three diseases, the next step was to ascertain to what great group these unknown poisons pertained. As indicated previously in the studies of extrinsic and bacterial poison, the changes in the ganglion cells are not particularized or distinct for the different poisons or groups of poisons, but are fundamentally the same in expressing mere phases of a single great pathological process.

Thus the identification of the class of the unknown poisons in these three diseases could not be determined from the histological changes in the nerve cells alone. But by the process of exclusion one after another of the several great groups of poisons as enumerated in the beginning of this section could be eliminated until the unknown poisons indicated by the neural parenchymatous

degeneration become narrowed down to a particular class—auto-poisons.

This process of elimination can be pursued with considerable certainty in grouping the unknown poison indicated by the structural traces of its action on the ganglion cells.

Partly by the character of the onset of the symptoms, partly by the course, duration and termination of the clinical history, and partly by the disclosures of the autopsy examination together with the microscopical examination of the organs in general, poisons of one or another particular class may be excluded with considerable certainty. Extrinsic poisons are generally easily excluded by the character of the clinical history. Bacterial poisons are excluded in a general way by the absence of the bacteria themselves, and the structural reactions of the body against them. Protozoal poisons and poisons due to pathogenic fungi, in the present incomplete state of our knowledge concerning them, are much more difficult to exclude.

But in all of these groups of poisons there is quite a number of characteristic features in the nature of the development of the symptoms, in the gross appearances at the autopsy, and in the general microscopical and bacteriological examination of the organs and fluids of the body. All this taken in the aggregate in any individual case under consideration excludes quite definitely one or another of the different groups of poisons.

Thus, in these three diseases, thyropravia, sun-stroke and uræmia, the unknown poisons indicated by the acute parenchymatous degeneration of the nervous system could by this process of elimination be reduced to the auto-toxic class. And I do not hesitate to believe, reasoning in this way, that I have established a method of taking evidence from a purely morphological standpoint, which, when conjoined with the process of elimination of other groups of poisons, is very trustworthy, in investigating the auto-toxic basis of mental and nervous diseases in general.

Furthermore, reasoning by analogy from these three, types of auto-intoxications of the nervous system more or less well-proven from the purely morphological standpoint in conjunction with the process of elimination of other groups of poisons, I am inclined to extend the auto-toxic basis of nervous and mental diseases quite widely indeed, especially to some of the forms of melancholia, epilepsy, mania and other varieties of mental and nervous diseases. I would, therefore, suggest most urgently that primarily this particular method of gaining evidence of the auto-toxic nature of mental diseases be tested in your investigations at the State Hospitals.

Finally I would remark that the discovery of acute parenchymatous degeneration in the nervous system in these three types of auto-intoxications, namely, thyropravia, sun-stroke and uræmia, adds still another great group of poisons to the list of extrinsic and bacterial toxic agents which all manifest their action on the nervous system, as elsewhere in the body, by this same pathological process. Therefore this finding of acute degeneration of the nerve cells due to the action of the acute auto-intoxicants, permits me to believe still more freely that not only extrinsic bacterial and auto-toxic poisons induce parenchymatous degeneration of the nervous system, but that the action of poisons in general is attended with this result, and that, broadly speaking, with the exceptions noted before, the converse of this proposition is also true.

But testimony gained along this single line of morphological evidence, even when joined with the eliminative method of excluding other groups of poisons as causal factors in the production of mental disease, is not alone sufficient to try in a rigidly judicial way the case of the auto-toxic basis of neural diseases. The study of structural cellular changes in the brain indicates other paths of evidence, but it can never afford by itself a complete basis for the draughting of the whole story of the auto-toxic basis of mental diseases. This evidence of the auto-toxic basis of mental disease from the study of struc-

tural changes in the brain should be linked with the testimony gained from the application of physiological chemistry to the problem of identifying the poison and ascertaining its physiological action in animal experimentation. Finally, after the auto-toxic poison identified by the physiological chemist has been exhibited to animals, the aid of pathological histology must be again invoked to ascertain and interpret the structural changes in the nervous system of the test animals. The conjoint testimony from these four steps of investigating auto-intoxications is the philosophical way of arriving at a complete understanding of the auto-toxic basis of mental and nervous diseases.

A great drawback in the investigation of disease, even at the present time, is the unresisted tendency of the specialized worker operating in a narrow field of research to explain the nature of a particular disease from testimony along a single line of evidence. He should record his data until such time as they may be properly joined with evidence along several diverse and additional lines of research, then, and then only, may safe deductions be made as to the whole nature of the disease.

Hence, in attempting to speak comprehensively of this subject of the auto-toxic basis of mental and nervous disease it becomes necessary to review the evidence from sources other than the study of structural changes in the nerve cells, such as the isolation or identification of the auto-toxic agents by physiological chemistry and the testing of their toxicity by animal experimentation.

Perhaps the best understood of the auto-intoxications is the group due to the retention of substances which ought, in the normal condition, to be excreted. In this group of auto-intoxications the study of the toxicity of the urine is exceedingly interesting and apparently reliable as an index or measure of the auto-toxic substances retained within the body. It has been estimated by Bouchard that the normal individual secretes waste products in fifty-two hours in the urine alone which, if retained in the body, would be a sufficient amount to prove fatal. This author, studying

the toxic effects on animals of urine from the normal individual, has established a *uro-toxic coefficient*. The uro-toxic coefficient means that a given quantity of urine from the normal individual injected in a test animal (rabbit) of a given weight produces a fairly uniformly definite result. The animal dies within a certain time with characteristic symptoms indicating involvement of the nervous system. If a smaller amount of urine produces this result in a test animal the urine is said to be *hypertoxic*, and, on the other hand, if a larger amount of urine is necessary to produce the same result, it is *hypotoxic*.

The hypotoxic condition of the urine may be taken to indicate a retention of the physiological products of metabolism, and during the onset of the symptoms accompanying an auto-intoxication of this class it appears to be demonstrable in animals that the toxic substances which are normally secreted by the urine are deficient in amount. If, on the other hand, during the cessation or after the acute attack of the auto-intoxication the urine when injected in animals shows a return of the excess of toxic substances retained during the attack, it is said to be hypertoxic to the test animal. This means that there is an excess over the normal toxicity of the urine.

Finally, while a hypertoxic condition of the urine may be taken to indicate the return of retained physiological waste products in the urine, it may also indicate the presence of newly or abnormally formed poisons within the body which have been absorbed into the circulation and have been excreted in the renal circulation. Thus while hypotoxicity of the urine before an attack of auto-intoxication, may be taken to indicate retention of normal physiological waste products within the body, hypertoxicity of the urine during or after an auto-toxic attack may indicate the presence of auto-toxic poisons of at least two sources.

First the hypertoxic condition of the urine, as an antithesis of the hypotoxic condition, may indicate the return of withheld physiological waste products. Secondly, the hypertoxic state of the urine has no relation to an antece-

dent hypotoxic state, but indicates the presence of poisons of another class than the "retention group," viz.: poisons which have been newly formed within the body, or poisons whose development habitually attends chemical process in the body, but which have not been properly transformed into innocuous compounds by certain organs for that purpose and have gained access to the general circulation.

For example: in the intermediary metabolism of the tissues in general some foreign toxic substance may arise and appearing in the urine, excreted from the circulation, gives a condition of hyper-uro-toxicity: or if in the development of toxic substances which habitually and normally attends gastro-intestinal digestion, these toxic agents are not nullified or transformed into useful body nutrient substances by reason of any derangement in the process of absorption, such toxic agents may in the same way appear in the urine and confer a hypertoxic quality.

Yet while this test appears a very delicate one and a reliable index of certain classes of auto-intoxications, deductions from it should be used conservatively and the extreme limit to which the French school has gone in ascribing diseases to auto-intoxications is open to criticism.

Hence in attempting to join to the morphological evidence testimony from these chemico-physiological lines of research in the auto-toxic basis of disease, I must be granted the liberty of defining my own position regarding this testimony, lest it should appear that such testimony when presented throughout the text of this section has not been given a conservative and judicial valuation as to how far it constitutes real evidence for the proof of the auto-toxic basis of mental and nervous diseases.

Taken in the aggregate these professions from the joint scrutiny of physiological chemistry and the testing of the toxicity of the body fluids by animal experimentation furnish considerable valuable presumptive evidence in a general way in the proof of the auto-toxic basis of neural and other diseases.

But it seems to me, to preserve a thoroughly judicial attitude, that it can hardly be said that physiological chemistry and the physiological testing in animals of suspected auto-toxic substances have furnished definite reliable evidence for the rigid proof of the auto-toxic basis of any individual case or disease of this category. Many of the data accumulated along the lines of chemical and physiological investigation of auto-intoxications seem very convincing and fit very well with our preconceived notions of these diseases. But I feel that the value of much of this testimony is only apparent because of the pitfalls of error which surround the premises of some of the *current* methods in these lines of investigation and beset the whole pathway of *interpreting* the results as claims for the auto-toxic basis of mental, nervous and other diseases. A just statement of the relation of these lines of research to the determination of the auto-toxic basis of disease might be presented in saying that they have but indicated the pathway to the common goal of final knowledge of these diseases toward which other lines of research, such as the morphological, are trending.

These two departments of research in the investigation of the auto-toxic basis of disease—physiological chemistry and the determination of the toxic properties of auto-poisons by animal experimentation, are to be considered as indicating the great amount of most valuable evidence of the auto-toxic nature of disease which is to be attained in the future, rather than as having accomplished much in the present for the elucidation of these diseases.

The methods of physiological chemistry in isolating auto-toxic substances are not at all infallible and are necessarily somewhat imperfect from the very nature of the excessively difficult field of their operations.

It is not infrequently most difficult to determine whether a suspected auto-toxic substance has been created or modified in the technical procedures undertaken for its isolation. It is not the apparently insurmountable defects of chemical isolation of auto-toxic products which invites censure,

but the extraordinary freedom with which deductions are made from these attempts of physiological chemistry to define the poisons.

For instance, the finding of a toxic substance in the alimentary canal in a disease of suspected auto-toxic nature does not necessarily imply that such a toxic substance was absorbed and present in the circulation. For toxic substances are habitually formed in the alimentary tract attending digestion, but are very probably transformed into innocuous or useful compounds in the process of absorption.

Nor does the finding of a toxic alkaloidal body in the urine invariably imply that precisely the same substance was present in the circulation and was not changed in being excreted in the urine.

The identification of an auto-poison must be traced, if possible, in its source and whole course through the body, especially in the blood.

As to the matter of the uro-toxic co-efficient and the determination of the toxicity of the urine by animal tests, it seems to me that the whole subject needs reconsideration. The uro-toxic tests would be of the utmost value to the study of auto-intoxication if properly undertaken. But it is difficult to see how much value can be attached to uro-toxic tests if conducted on a mere volumetric basis, uncontrolled by chemical analyses.

If the solids of the urine occur in different degrees of concentration as indicated by its specific gravity, the conditions of hypo- and hypertoxicity, if determined on a volumetric basis alone, may simply indicate different degrees of concentration of the solids of the urine, rather than a measure of uro-toxicity as an indication of auto-intoxication.

How may the toxicity of different samples of urine in disease be compared with each other or with a normal standard of toxicity, if ascertained on a volumetric plan, in which the amount of solids injected varies with the shifting scale of specific gravity?

Is it not possible that some of the hypertoxic records of the urine in the inauguration of, or during the early stage of an acute attack of illness are more to be ascribed to a concentrated condition of the urine, a condition generally present at the commencement of an illness, than to the elimination of some newly formed or unknown forms of poisons from the body?

On the other hand, in the hypotoxic records of uro-toxicity which are used equally freely with the opposite condition in urging the argument for auto-toxic production of disease is it not possible that the dilution of the solids of the urine is more responsible for the hypotoxic condition than the absence of particular poison or poisons?

Has there always been a careful elimination of non-pathogenic substances, which, when ingested, confer a marked degree of toxicity of the urine in the hyper-uro-toxic observations? May not articles of diet exercise an influence upon the degree of uro-toxicity; may not acids, for instance, increase the elimination of ammonia compounds; and this entirely independently of disease?

Considering these sources of error in deductions from uro-toxic determinations, together with the not infrequent lack of explicit description of technical methods in the recorded observations of uro-toxicity, especially in relation to auto-toxic diseases, one is constrained to think that uro-toxic deductions have been forced ahead altogether too hastily.

It seems as if some observers had rushed into conclusions from uro-toxic determinations without even pausing to inquire into the validity of the premises upon which their technical methods are founded.

On account of these defects in chemico-physiological deductions, I hesitate the less in urging, for the present, the value of the morphological research, joined by the process of exclusion of other poisons, as outlined in the beginning of this address as a method of determining the auto-toxic basis of disease, and also in defining, in a measure, the limitations or extent of this basis.

It can be seen, therefore, that the determination of degrees of uro-toxicity and the estimation of these uro-toxic degrees by a standard of comparison, must, if conducted on a volumetric basis, be controlled by quantitative chemical analysis.

The reduction of the samples of urine to be compared for toxicity to a common arbitrary standard of specific gravity, suggests itself as an apparently reliable method with fixed values in determining the uro-toxicity in terms of a normal uro-toxic unit. Such a procedure is unsafe, however, for in concentrating a dilute condition of the solids in a sample of urine, their chemical constituents might be changed. Chemical compounds might be driven off or other new substances formed, as, for instance, the ammonia compounds.

Apparently the only accurate way of measuring pathological degrees of toxicity of the urine in terms of a fixed unit of normal uro-toxicity is by basing the determination upon fixed amounts of the solids of the urine, and E. E. Smith, Ph. D., of New York, permits me to embody his suggestions of such a method for the determination of uro-toxicity in this text.

His plan is to ascertain the amounts of the *solids* of the urine which will prove fatal to the test animal of a given weight in a given time. Having established the normal standard, hyper- and hypotoxic degrees of toxicity are to be measured in terms of the relative amounts of solids. Volumes of the urine containing known quantities by weight of the urinary solids are then injected in the animals for the determination of hyper- or hypotoxicity. The criticism might be offered to this suggestion that a larger volume of urine would have to be injected into the animal in one case to contain a given weight of urinary solids than another, but I think it has been shown sufficiently well in the injection of indifferent fluids into the circulation of animals that the mere variance of the bulk of the watery element of the urine, within certain limits, if injected cautiously, does not have any effect on the animal

which would interfere with or modify the toxic effects of the urine.

In Dr. Smith's suggestion of comparing fixed amounts of the urinary solids in determining uro-toxicity we are dealing with the subject on an accurate basis of standardization so that the toxicity of several samples of urines may be measured and compared with each other in explicit mathematical terms.

Determinations of uro-toxicity and other chemico-physiological data have been adduced throughout this text, and seemingly urged in individual cases as arguments in favor of their auto-toxic nature. But this has been done more from an appreciation of the ideal aid which will be rendered by chemico-physiological investigation of auto-toxic diseases in the future, than from a lack of understanding the present defective character of this kind of research which is only to be expected in such a very early stage of its application to the study of auto-intoxications.

Any satisfactory systematic and detailed classification of the auto-intoxications in the present limited stage of our knowledge is out of the question. However Albu suggests the *following general classification of auto-intoxications*:

1. *Auto-intoxications from the suppression or disturbance of the functions of an organ.*—These are due to diseases of the glands with or without anatomical changes, although the most frequent anatomical lesions in the glands accompanying these auto-intoxications are atrophic changes.

The auto-intoxications of the thyroid gland belong in this list, such as myxœdema, and cachexia strumipriva. Diabetes, acute yellow atrophy of the liver, and Addison's disease, due most undoubtedly to lesions respectively of the pancreas, the liver and the suprarenal capsules, are also included here. This list, according to Albu, should also include the diseases which are due to the suppression of the function of those organs, such as the liver, which destroy such absorbed noxious material from the gastro-intestinal tract or other poisonous metabolic products as are constantly formed within the body.

2. *Auto-intoxications which occur from anomalies in general metabolism without any definite localization.*—In this class of auto-intoxications the diseases which depend upon the absorption in the circulation of the intermediary products of metabolism or the products of retrogressive metamorphosis belong, for instance, gout and oxaluria.

3. *Auto-intoxications which are caused by the retention of the physiological products of metabolism in the different organs.*—In this category belong the severe form of poisoning due to extensive destruction of the skin by burning, carbonic acid poisoning by inhibited or deficient respiration, uræmia and eclampsia gravidarum.

4. *Auto-intoxications due to the over-production of physiological and pathological products of the organism,* such as hydrothionæmie, ammoniæmia, acetonuria, diaceturia, cystinuria, etc., also diabetic coma, coma carcinomatosum, etc., and Basedow's disease.

Midway between groups three and four, (according to this author), and partaking in a measure of each, are placed the great majority of auto-intoxications arising from the gastro-intestinal tract, associated with acute or chronic digestive disturbances, with or without pathological changes in the gastro-intestinal tract.

Depending upon the regional distribution, or localization of the source of the auto-intoxication, the same author suggests the following classification:

1. *Auto-intoxications from the skin.*—For example, the toxic symptoms due to extensive burning of the skin.

2. *Auto-intoxications from the lungs;* carbonic acid poisoning from deficient lung capacity or respiration.

3. *Auto-intoxications from the kidneys;* uræmia and eclampsia.

4. *Auto-intoxications from the suprarenal capsules;* Addison's disease.

5. *Auto-intoxications from the gastro-intestinal tract.*—The auto-intoxications from this source comprise a very large group, and their relations to the production of nervous and, probably, mental symptoms is intimate and pro-

nounced; for instance, tetany, epilepsy (?), periodic family paralysis, eclampsia infantum, Thomsen's disease (?), and according to some French observers, melancholia and a class of psychoses which has been termed by them "visceral psychoses."

6. *Auto-intoxications from the liver*; acute yellow atrophy, icterus gravis, cholæmia.

7. *Auto-intoxications from the pancreas*; diabetes mellitus.

8. *Auto-intoxications from the thyroid gland*; myxœdema, cachexia strumipriva, and probably Basedow's disease.

A classification on the basis of physiological chemistry is indicated by Kraus and Honigman as follows: (a) Auto-intoxication of intermediary metabolism, (b) acid auto-intoxications, (c) human diseases in which acid auto-intoxications are due to the accumulation of β oxy-butyric acid and its compounds, (d) the uric acid diathesis, (e) alkaptonuria, (f) the auto-intoxications from the internal secretions, (g) cachexia thyroidinea, (h) uræmia.

These various types of auto-intoxications must be very important factors in the production of nervous and mental diseases, for the nervous system is more sensitive, apparently, to this group of poisons than any other tissue or organ in the body. The prevailing symptoms of most of the auto-intoxications are most decidedly due to poisoning of the nervous system; for instance in myxœdema, thyropravia, Basedow's disease, insolation, tetany, some if not most (?) examples of epilepsy, etc. In many cases of uræmia, the predominant symptoms are manifestations of poisoning of the nervous system.

In others of the more obscure auto-intoxications the nervous symptoms are the only apparent manifestations of the auto-intoxication. In fact, the only clue to indicate the presence of some of the more obscure auto-intoxications, is exclusive symptoms of the nervous system; for instance, the only obtrusive indications of some of the intestinal auto-intoxications are migraine, dizziness, syncope,

delirium, coma, somnolence, sopor, tonic and clonic spasms, or epileptic and epileptoid attacks, and many cases of epilepsy, melancholia, mania, periodical forms of insanity and other varieties of mental disease.

The reason for this susceptibility of the nervous system to auto-toxic poisons is patent. The high organization of the ganglion cell, the most complex cell in the human body,—a cell in which the internal structure is most intricate and delicate,—must naturally, other things being equal, undergo changes from contact with a poison and express parallel physiological disturbances more readily than the more lowly organized cells which compose the ordinary viscera, or the static cells of the general tissues of the body.

The important point which I wish to recall to your attention in connection with involvement of the nervous system with this auto-toxic group of poisons is this: that while the investigation of the nature and source of these auto-toxic poisons is an exceedingly difficult branch of physiological chemistry and animal experimentation, we have at the present time, in the searching application of cytology and cytological methods, a comparatively simple means of observing the *morphological effects of these poisons on the ganglion cell*. We can, therefore, at least, no matter how obscure and inscrutable these auto-toxic poisons may be, study the traces of their action upon the ganglion cell by cytologic methods, such as the Nissl procedure. From the morphological standpoint very much is to be done to show that there is a definite tangible change in the ganglion cell from this auto-toxic group of poisons. Any case, therefore, of the more acute melancholias or manias, particularly of the periodical type, in which poisons from extrinsic source or bacterial toxins can be excluded, should be examined by the purely cellular methods for the morphological changes which will postulate the action of auto-toxic poison or poisons on the nerve cells. The periodical psychoses are particularly suggestive of the presence of auto-toxic poisons and should also be examined properly from the standpoint of the uro-toxic equivalent.

It is exceedingly difficult, at the present time, to determine which of the individual diseases of the nervous system, and which of the general diseases of the body, accompanied by prominent manifestations of the nervous system, belong in the category of auto-intoxications. Apparently the tendency of the French school is to place all nervous and mental diseases, or even somatic diseases with involvement of the nervous system, which can not be accounted for by bacterial toxins or extrinsic poisons, in the category of acute periodical or chronic auto-intoxications. This is manifestly hazardous, for it has not been at all definitely determined to what extent bacterial or protozoal or other poisons are responsible for these diseases of the nervous system. Until this shall have been done, and in fact, until the whole toxic basis of nervous and mental diseases has been studied more thoroughly, especially in defining the limits of the several sub-groups of toxic substances as etiological factors in the production of neural diseases, the classification of neural diseases due to auto-intoxications can hardly be expected to become precise.

Nevertheless, while at present no definite and precise statement of the relation of the whole class of auto-toxic poisons to the production of neural diseases can be given, there are a few examples of auto-intoxication in which there is an unequivocal demonstration of the involvement of the nervous system by an auto-poison. In experimental thyropravia in dogs the universal acute degeneration of the destructive type which involves the whole cortex of the brain corresponds very well with the fatal manifestations of irritation and destruction of portions of the nervous system. These changes in the ganglion cell can have no other explanation than in the action of an auto-poison circulating within the body which comes in contact with the ganglion cell. In certain cases of uræmia I have been able to demonstrate acute degeneration of the cortical cells, but of a much less extensive and severe type than in thyropravia. In insolation I have also found an acute degeneration of the nervous system of variable degrees of severity, which must be due

to an auto-toxic poison. While the nature of the poison in this case is entirely obscure, there is absolutely no doubt about the way it acts upon the nervous system. (Plate I.) The poison produces an acute degeneration of the cortical cells which, in some instances, goes on to destruction of the cell. I cherish the expectation that in myxœdema, in the late neural manifestations of Addison's disease, and diabetes, in tetany, Basedow's disease, the epilepsies, in many of the melancholias, manias, periodical insanities, and very many other forms of mental and nervous diseases that similar phases or results of neural parenchymatous degeneration will be found to furnish a definite basis to explain the parallel clinical manifestation.

The gastro-intestinal tract, including the liver, would seem to be a most important source of neural auto-intoxications. Here poisons are habitually and normally formed, and the only safeguard of the body against them (unless destroyed by the bacteria of the gut) is their transformation into innocuous compounds or useful body nutrients in the process of intestinal absorption or in the hepatic circulation.

How readily, then, may these constantly present *latent* poisons of the gut be transformed into *potential* poisons through some hidden intangible error in the process of absorption or by some more palpable actual lesion of the organs concerned in this process.

It is from this source that we can best understand the insidious leaking into the circulation of poisons which are probably not generally acutely and intensely virulent but are more often of the slow, chronic, persistent, and exacerbating type so dangerous to the integrity of the cortical neurons of the brain by their prolonged or repeated action.

But it is the exception to find symptoms indicating the *development* of such poisons. This is entirely unobtrusive and hidden from clinical scrutiny. Only the *effects* of the poison are witnessed at a distant point of the body as a rule in a slow, gradual, persistent or intermittent poisoning

of the nervous system, especially in the brain cortex, attended with the parallel mental or nervous symptoms.

What a hopeless problem it has been in the past, without competent methods even to witness these effects of poisons in minute internal changes in the nerve cells, to trace out the cause residing in such a class of auto-poisons which give no objective signs of their existence or the slightest tangible clew of their source and development. It is not remarkable with such an intangible relation of cause and effect that many forms of mental disease have seemed such utter mysteries and barriers to morphological chemical investigation.

At present, however, the application of the methods and knowledge of modern cytology to the nervous system furnishes the means of demonstrating these effects—we may see the handiwork of a poison in the brain even if its nature be unknown. This alone is a great step forward in the progress of the pathogenesis of mental diseases.

One of the strongest arguments in favor of the causation of many of the sub-acute, periodical, or chronic psychoses by the gastro-intestinal auto-poisons is the persistent or confirmedly intermittent character which may be justly imputed to these poisons from the very nature of their development.

A poison of this nature is admirably suited to explain the etiology of some of the most obscure forms of mental disease, such as certain of the varieties of melancholia, mania, the periodical or alternating forms of these affections, neurasthenia (?), the graver hysterical and cataleptic conditions, etc., associated with these psychoses.

The acute, sub-acute or chronic character of some, if not many, of the melancholias, manias, (with the exception of delirium grave and similar acute manias of bacterial or extrinsic toxic origin) and allied psychoses, corresponds to variations in the intensity and duration of exhibition of the auto-poisons. These fluctuations in intensity and duration of the action of the poison on the cortical nerve cells from the peculiarly variable factors

governing their development can be perhaps more graphically realized in the gastro-intestinal than in any other class of auto-poisons.

Intensity and duration of exhibition of poisons in general as well as the auto-poisons are the great factors which control the character and termination of the toxic mental and nervous diseases. Upon these two factors, especially the latter, depends the issue of recovery or improvement or a chronic incurable disease dependent upon permanent damage to the nervous system.

While intensity and duration of exhibition are variable functions of the poison itself, both of these factors, especially the latter, are greatly modified by the body forces which combat poisons.

For instance, a given (auto) poison will operate longer in an individual with impaired emunctories than in the normal subject, or act more intensely in a man whose nerve cells have been previously damaged by alcoholism or other poisons. The variable factors of the body forces modifying duration and intensity of poisons can not be appropriately discussed here but are referred to incidentally in most of the ensuing sections on this subject of the toxic basis of neural diseases and are more especially summed up in the consideration of the differential equation of toxic diseases in Section IX.

Studies of general toxic changes in the nerve cells, and also in three examples of neural auto-intoxications (insolation, thyropravia and uræmia) with especial reference to the modifications of the toxic cell changes induced by mutations in the intensity and duration of the action of the poison confirm the following statements.

The severity of toxic degeneration of the nerve cell is in direct ratio to the duration of the action of the auto-poison.

While the poison may be intense and virulent, if it acts for a brief period only on the nerve cell, the resultant degenerative changes may be recovered from upon the cessation of the poison. There may be profound internal

changes in the cytological elements, (Plate I, Fig. 1) but, nevertheless, the cell may be built up again and recover both structure and function.

But if the action of the poison continues beyond a certain period the degenerative changes eventuate in destruction of the cell (see Section V, also Plate I, Fig. 2). There is in this case either death of the individual or, if he recovers, the nerve cells (in whatever portion of the nervous system acted upon) are damaged permanently, and their loss is absolutely irreparable.

Although it was previously stated that restoration or destruction of the nerve cells in toxic degeneration depended upon the duration of the exhibition of the poison, this is to a greater or less extent controlled by the factor of intensity of the poison.

In their action on the general organism but especially on the nervous system, duration and intensity of poisons are in a general way inverse functions of each other.

That is, within general limits, the longer a poison acts upon the nervous system the milder or less intense is its virulence, and the more intense the nature of the poison the briefer is its duration of exhibition.

Speaking generally, the death of the individual fixes a limitation to the duration of the exhibition of an intense virulent poison, and for the same reason a poison of persistent chronic exhibition to the nervous system must of necessity be mild in severity.

Although anticipating the essence of later text (in Section V), it may be stated that the duration factor of an auto-poison which, within general limitations, is inversely proportional to its intensity, determines the question of recovery or destruction of the neurons from toxic degenerations. The determination of this crisis in the nerve cell, therefore, does not depend so much on any inherent property of the poison as on the duration factor.

From the operation of the variable factors modifying duration of action and intensity (both on the part of the development of the poisons themselves and on the part of

the operation of the body forces), there is a very extensive series of gradations in these two factors in the auto-poisons, particularly those of the gastro-intestinal tract.

All sorts of gradations in intensity and duration of gastro-intestinal auto-poisons, as well as in auto-poisons generally, exist between an acute intense poison of momentary or brief exhibition at one end of the series, and a slowly and gradually acting mild and persistent poison at the other. Midway between these extremes of acute and chronic exhibitions of the poisons are the sub-acute group of auto-poisons of subacute intensity and duration.

These three great groupings of auto-poisons according to the variable factors of intensity and duration of action correspond to certain phases of degeneration of the nerve cells. This in turn determines the prognosis, course and termination of not a few examples of acute, subacute and chronic types of mental and nervous diseases.

The whole course, duration, termination and prognosis of toxic mental and nervous diseases, whether due to auto- or other poisons, depends upon the course or termination of parenchymatous degeneration controlled by the duration and intensity factors of the poisons.

It is, therefore, exceedingly important to define these courses and terminations with more individuality than is implied by the comprehensive term of parenchymatous degeneration.

I would therefore suggest the terms *cytolysis*, *cytoclasis* and *cytothesis* to particularize certain stages and results of parenchymatous degeneration of the nervous system which govern the prognosis and general character of the toxic neural diseases.

The term *cytolysis* (from κύτος, a hollow, a vessel, hence a cell, and λύσις, the act of loosing or resolving—hence cell resolution) signifies the successive series of cell degeneration up to, but not beyond, the point of destruction of the cell. Cytolysis comprises the phases of degeneration in parenchyma cells which may be recovered

from; it signifies resolution, but not destruction of the cell, and may be succeeded either by restoration or destruction of the cell. (Plate I.)

The term *cytoclasis* (κύτος, a cell, κλάσις, the act of breaking to pieces—hence cell destruction) comprises the progressive phases of parenchymatous degeneration which involve destruction of the cell. (Pl. I, Fig. 2.) Cytoclasia signifies the process of necrosis of the cell. In the neuróns cytoclasis is permanent and absolutely irreparable. It is a process that succeeds cytolysis.

The term *cytothesis* (from κύτος and θέσις, the act of binding or tying together—hence cell restoration or reconstruction) comprises the steps of restitution of the cells, after the initial and non-destructive stages of parenchymatous degeneration. The cytothetic process is the reverse of the cytolytic.

At this point in our discourse, the relation of acute and chronic parenchymatous degeneration of the nervous system in relation to auto-toxic agents may be briefly referred to. These processes are not essentially distinct. They are both manifestations of the same thing—an expression of the chemical reaction between a poison on the one hand and the substances of the cell on the other. Both forms, or better, conditions of the parenchymatous degeneration have the same histological substratum and they differ only in the rapidity of their development according to the duration factor of the associated toxic action. The one condition is produced more gradually, slowly and persistently than the other.

In the acute phase or condition of toxic neural parenchymatous degeneration the stages of cytolysis are produced more or less rapidly, which elicit corresponding degrees of the suddenness of the onset of the neural symptoms. This as a general rule is more liable to be succeeded by cytothesis,* but cytoclasis of the nerve cells may result dependent upon the duration of the poison.

* Incomplete or retarded cytothesis after the cessation of the poison, and the relation of the body forces to cytothesis of the nerve cells are spoken of in succeeding sections of the text, especially in Section V.

In the chronic phase of parenchymatous degeneration of the nervous system, as in other parenchyma cells throughout the body, the stages of degeneration occupy a longer time in their development. The process goes on slowly, gradually, and continuously with exacerbations in the action of a poison insidious in its mildness but fatally dangerous to the integrity of the nerve cells acted upon. This process is uniformly attended with cytoclasis of the neurons, and virtually ordains destruction of the neurons from the beginning, because there is little or no opportunity for the operation of cytothesis. The poison does not cease long enough for any complete restoration of the neurons; it is too constant and persistent. (See Plate II.)

One group or mass of neurons steadily and progressively undergoes the successive stages of cytolysis, and then passes on to the phases of cytoclasis. Meanwhile another group of neurons is starting in on the same slow and gradual, but none the less sure and inevitable, pathway to destruction, because of the lack of cessation of the poison whereby the process might be halted so as to permit recovery of the cells in the initial or cytolytic stages of degeneration.

Thus this process of chronic cytolysis inevitably eventuating in final destruction of the neurons is liable to be slowly and gradually progressive; more and more neurons successively become involved as the length of the time of exhibition of the poison increases.

Midway between the acute and chronic extremes in the manner in which parenchymatous degeneration of the nervous system occurs is the subacute phase of this process. The qualities of the poison which produces the subacute exposition of parenchymatous degeneration have also in general terms a middle ground character between the intense poisons of acute sudden onset and brief duration, and the mild, insidious poisons of persistent duration. The poisons corresponding to subacute parenchymatous degeneration are, speaking generally again, of medium intensity and of a duration which is only moderately protracted.

The subacute condition of parenchymatous degeneration is liable to partake of the qualities of both the acute and chronic forms. To a certain extent in typical cases, it shares in the non-destructive properties of the acute forms, and also, somewhat of the destructive tendencies of the chronic form.

When the poison associated with the sub-acute variety of parenchymatous degeneration in the nervous system ceases, a variable number of neurons, dependent upon the duration of the poison, which were primarily involved when the poison first began to act, may have gone on to cytolysis. But another great mass of ganglion cells has not yet reached the stage of destruction, and when the subacute exhibition of the poison ceases they may recover. These neurons are only in the cytolytic phases of degeneration and the symptoms indicating their loss of function will not prove to be permanent as in the case of a chronic poison. They vanish when cytolysis takes place after the cessation of the subacute exhibition of the poison.

What is called peripheral neuritis is a most beautiful example of subacute toxic parenchymatous degeneration of some of the neurons of the spinal cord. In this disease, we know clinically how the recovery from the symptoms may be complete or in some cases only partial. This is because degeneration of some of the anterior horn cells has gone on to cytolysis, while the great majority of them have not gone beyond the stages of cytolysis. In the majority of cases in this example of subacute degeneration of the anterior spinal neurons, the degeneration does not, as a rule, go beyond the limits of cytolysis. When it does we can understand how the majority of the symptoms slowly disappear with the progress of cytolysis, and how other paralyses may remain permanently for the reason that some neurons have gone beyond the recoverable stage of cytolysis into cytolysis.

There are, then, three great periods in the time factor of the exhibition of poisons to the nervous system, the

acute, subacute and chronic periods. Yet these periods are not individual entities, and no hard and fast line can be drawn between them. They merge into each other by imperceptible serial gradations, especially since some poisons may show an intermittent exhibition in all three stages of duration. Hence the same thing is to be said of the inexact limitations of the acute, subacute and chronic conditions of parenchymatous degeneration of the nervous system produced by these variable mutations of the time factor of poisons, and also of the resulting expressions of the associated acute, subacute and chronic forms of development of the toxic neural diseases.

To sum up the matter briefly and in a general way, the acute, subacute or chronic development of the toxic neural diseases is very largely the expression of corresponding conditions of acute, subacute or chronic phases of neural parenchymatous degeneration caused and controlled by mutations of the time factor in the exhibition of poisons.

As previously indicated, the time factor in the exhibition of poisons—an inverse function of their intensity—is subject to such a vast number of progressive serial increments from the evanescent to the persistent periods of duration. Hence the acute, subacute and chronic conditions of the toxic parenchymatous degeneration, and the acute, subacute and chronic development of the associated neural diseases merge imperceptibly into each other.

Recovery of the neurons takes place most regularly in the acute poisonings of the nervous system, for the toxic neural parenchymatous degeneration usually does not go beyond the phases of cytolysis. The poison ceases before cytolysis passes over to cytoclasis. For example, cytolysis of the cortical neurons underlying the symptoms of the acute delirium in sun-stroke, typhoid fever or in the acute infectious diseases is generally succeeded by complete cytothesis of these neurons upon the cessation of the poison.

Recovery of the neurons is also possible in the subacute poisonings of the nervous system. But it is more tardy,

irregular and more liable to be incomplete than in the acute toxic condition, for the border line between cytolysis and cytoclasis is more liable to be crossed. In a subacute poisoning of the nervous system there may be nearly complete recovery, but we can never predict to what extent cytoclasis may have been induced by the more protracted exhibition of the poison. We are more liable perhaps to record improvement in such a subacute type of poisoning of the nervous system than complete recovery.

In chronic poisoning of the nervous system recovery is hopeless, for the relentless poison does not stop long enough to allow a host of neurons which are only in the stages of cytolysis to recover. These are ordained to destruction like their predecessors involved in an earlier period of the action of the poison.

As a general rule, therefore, cytothesis finds its most favorable conditions in the acute poisonings of the nervous system, the conditions are less favorable in the subacute toxæmias, and the process is incompatible with the chronic form of poisoning.

The nervous system recovers from the action of auto-poisons or other poisons in the great mass of ordinary familiar acute and subacute general body disease not because the brain escapes actual structural changes in its cells. Nor is it because the nervous symptoms are expressions of "functional disturbances," but by reason of this wonderful process of cytothesis in the nerve cells.

It is oppressive to the mind to realize how in nearly all of these cases of poisoning of the body, and in almost all of the cases of the great ordinary general toxic diseases of the body which happen about us every day, the brain cells are actually changed and start in on the perilous pathway toward destruction. Yet they are rescued by cytothesis upon the cessation of the poison. I may, then, be well absolved from apologies for emphasis and repetition of the importance of cytothesis, the great redeemer of the mind, the brain and the nervous system from impairment or destruction, after acute or subacute poisoning.

Were it not for the process of cytothesis* mental and nervous affections would be the most frequent of all diseases. They would almost overshadow in importance all other forms of disease of the body combined, for the nervous system is the most sensitive organ in the body to the action of poisons. Poisons will act on the nervous system when we find but little or no trace of their action elsewhere in the body.

Were it not for this salvation of cytothesis the amount of mental disease would be simply appalling. Absence of mental and nervous diseases would be the exception rather than the rule in civilized communities.

Therefore, while it has always been a matter of clinical observation that mental diseases of acute or subacute development may recover, yet I believe that this matter of cytothesis explains why this is so in a less empirical manner.

With this reference to the relation of the time factor of poisons to the process of cytothesis, let us consider the action on the nervous system of poisons of acute, subacute and chronic development from the gastro-intestinal tract.

Such a consideration must, of course, in the present state of our knowledge of auto-poisons, rest largely on hypothetical grounds. Yet, having studied the action on the nervous system of several different kinds of poisons from different groups of pathogenic toxic substances, with especial respect to the factors of intensity and duration, and having seen that all of these poisons are liable to produce the same result,† namely, cytolysis associated with cytothesis or cytoclasia of the neurons, I feel justified in assuming that these alimentary auto-

*My opinion of neural cytothesis and its relations to cytolysis and cytoclasia is founded upon studies of cytolysis in acute neural symptoms from which clinical observation has shown recovery to be the rule, and in subacute neural disease where partial recovery attended with permanent symptoms of destruction of neurons permits one to identify and distinguish cytolysis from cytoclasia. (Section V.)

†This statement is to be modified by the consideration of exudative inflammation of the nervous system in Sections VII and X.

poisons will act on the nervous system in an entirely similar manner.

Moreover, the clinical phenomena of one nervous disease, namely, tetany, which often seems definitely due to alimentary auto-poisons, are in accord with the general action of poisons on the nervous system.

The establishment of the gastro-intestinal auto-toxic origin of many examples of a single individual disease of the nervous system, as in tetany, furnishes most valuable aid in ascertaining the connection of these poisons with other forms of neural disease.

I have not actually witnessed cytolysis of the nervous system which could be definitely ascribed to the action of gastro-intestinal auto-poisons, because of the great difficulty of identifying these poisons in the general group of auto-poisons. Nevertheless, reasoning by analogy of the action of other poisons, replaces an entirely conjectural basis in the presentment of these suggestions as to the action of gastro-intestinal poisons.

I.—*The acute gastro-intestinal auto-poisons.*

a.—If a poison of this class, although of considerable intensity, develops suddenly but is of evanescent exhibition, the degrees of cytolysis of the cortical neurons are probably very slight. Cytothesis occurs very rapidly after the cessation of the poison. There is an acute attack of nervous symptoms and the neurons of the particular segment of the nervous system selectively acted upon by the poison return to their normal condition.

If epilepsy be due to the action of gastro-intestinal auto-poison—which, I am inclined to believe, is the case in many but not in all instances of the disease—it is a most beautiful example of the persistent intermittent action of an *evanescent* poison upon the cortical neurons. The poison is of such momentary duration that whatever the traces of its cytolytic action on the cortical neurons may be they are quite promptly effaced by cytothesis.

It may be that the exhibition of the epileptic poison is

so momentary as to produce only chemical changes in the neurons without any parallel morphological changes which can be recognized even with the present delicate methods of cytological technique. The determination of such a condition is to be sought out by cytological chemistry, a line of research which is in too early a stage of development to be of much service at present.

In either case, whether the action of the poison or poisons of epilepsy be associated with chemical or structural changes in the motor cortical neurons, the poison is so evanescent that restoration of the neurons is prompt and perfect.

Thus in idiopathic epilepsy, the attacks due to the action of an evanescent poison circulating in the blood may be prolonged for months and even years, without apparently producing cytoclasia of the motor cortical neurons. This disease is a fine example of the definite relationship of cytothesis of the nerve cell to the duration of the poison.

Epilepsy heads the list of toxic diseases in the brevity of the exhibition of the poisons. The action of the poison or poisons of epilepsy on the nervous system illustrates the first member of the great progressive serial scale of the time factor of poisons in toxic diseases. This varies between an evanescent poison at the beginning of the series and an indefinitely prolonged or constant toxic exhibition at the final end of the scale. Hence, the disease is one of the finest examples of rapid and perfect cytothesis of the cortical neurons, and this apparently continues after each attack for a long time—for months and even years.

These opinions of the toxic origin of epilepsy are not mere conjectures, nor are they prompted from a tendency to make the disease fit in with too generalized an application of the toxic basis of neural disease, but are formed from the results of a diligent search of some years for the structural changes in the brain in ten or twelve cases of the idiopathic form of the disease. I can find no explana-

tion of the results of the microscopical examination of the brain in these cases, except by ascribing these results to the transient action of an intermittent poison, which gains access somewhere to the general circulation.

None of these cases of (idiopathic) epilepsy showed the great clew of the workings of a poison in cytolysis of the motor neurons. This seemed at first very mysterious in view of the fact that the ganglion cells are the most exquisitely sensitive cells in the whole body to betray the action of a poison. But at present, from the correlated study of the action of well known poisons on the cortical nerve cells, I can readily understand why cytolysis of the nerve cells is not demonstrable in epilepsy because it is so promptly effaced by rapid cytothesis dependent upon the evanescent character of the poison.

Nevertheless, while prevented thus far from gaining testimony of the action of a poison in epilepsy by reason of the rapid cytothesis of the affected nerve cells, another portion of the brain, namely, the neuroglia, furnishes evidence of the toxic nature of this disease.

The subject of the toxic basis of neural diseases is so vast that throughout the sections of the second part of this discourse, the action of toxic substances for the sake of simplicity, is limited as far as possible to the parenchyma or neurons of the nervous system. The action of toxic substances on the other component element of the nervous system—the stroma or neuroglia—is manifested in an entirely different manner than in the parenchyma, and will be discussed later in Part IV of this address.

Having found an increase or *overgrowth of neuroglia in the sub-cortical zones* in the motor regions in the examination of several of these idiopathic cases, I am unable to interpret this except by the action of a poison for this reason. In the study of the action of rabic virus in rabbits, I can demonstrate that the expression of its chemical action on the ganglion cells takes the form of degeneration, but the earlier stages of the action of the poison on the stroma of the brain are evidenced by cell proliferation.

Hence it appears that the stroma as well as the parenchyma of the brain may indicate the action of a poison although in a different way. This increase of neuroglia in the sub-cortical zones in epilepsy I do not regard as a primary cause of the symptoms, but as a secondary effect of a poison.

I have reasons, therefore, from the morphological line of investigation, which, when joined with the peculiar clinical behavior of the disease, make the acceptance of its toxic basis almost compulsory. There seems to be no other way of explaining the symptoms of the disease or the associated changes in the brain. Furthermore, the poison must be of the auto-toxic category. For the development of these poisons is perfectly compatible with the evanescent character of the epileptic poison, while none of the members of the other great groups of poisons is endowed with such a peculiar transitory characteristic.

Finally, I am unable to reject the suspicion that the particular class of auto-poisons perhaps best adapted to confer the evanescent property of the epileptic poison is the gastro-intestinal group. This seems so because of the facility with which latent poisons in this region may momentarily become potential, and on account of the close analogy which epilepsy bears to tetany, a disease frequently caused by gastro-intestinal auto-intoxication. It will be recalled that not infrequently antiseptic therapeutics of the alimentary tract modifies the occurrence of the epileptic attacks to a considerable extent.

Yet other varieties of auto-poisons may be responsible for epilepsy just as well as the gastro-intestinal class. The auto-poisons of intermediary metabolism, of which we are almost entirely ignorant, may contain a member of this evanescent character. Or a poison from some other equally unknown source in the body may accumulate beyond the nullifying capacity of some one of the poison-destroying organs (like the liver); then the poison suddenly gains access to the blood and the epileptic fit may occur.

Thus, while it may be affirmed quite definitely that

epilepsy is due to the action of an auto-poison, we know too little about these poisons to classify or identify this auto-toxic agent of epilepsy. I have, therefore, classified the disease among the gastro-intestinal auto-intoxications in a temporary and tentative fashion. This has been done merely because we do understand something about the development of this class of auto-poisons, and on account of the resemblance of epilepsy to tetany, the one clearly understood type of gastro-intestinal auto-intoxication.

A number of most interesting questions present themselves with this reference to the auto-toxic basis of epilepsy, but they must be left for a subsequent chapter of this narrative in Part IV. Such questions are of this order: the ultimate results of the poison in epilepsy; the development of insanity associated with epilepsy; the damage to the brain from the conventional and purely empirical use of bromides, without regard for the probable cytolytic, if not even cytoclastic, action on the cortical nerve cells which their abuse entails; the extent of and distribution of the neuroglial hyperplasia in epilepsy; the selective action of the epileptic poison on the nervous system; the question of the extension of the action of the poison beyond the motor regions to other spheres of the cortex; the limitations of cytothesis in a late period of the disease.

b.—If the gastro-intestinal poison be again of considerable intensity but of somewhat longer duration than in epilepsy, quite similar manifestations occur in the toxic action upon the motor cortex. The duration of such a poison is *transient* rather than evanescent, and elicits the symptoms of the typical cases of tetany. Here, again, like the case of epilepsy, whatever measure of slight cytolysis of the motor neurons of the cortex is induced by the poison, is promptly effaced by cytothesis after the cessation of the poison. For this reason it is not probable, as in epilepsy, that the cytolytic traces of the poison could be witnessed, unless the cortex were examined immediately after the attack.

The poison producing tetany, however, is not so uniform in the element of the time factor as that of epilepsy. The poison of tetany seems subject to much variation in this respect, for the attacks show many different grades of severity and duration.

In the severer and more protracted attacks and especially in the fatal forms of the disease, cytolysis should be quite pronounced if the brain were examined shortly after the attack. In the fatal form there is undoubtedly cytolysis of the motor cells of the motor cortex and probably severe degeneration of cells in other cortical regions. In these fatal cases, while the poison at first has a selective action on the motor cortex as in the mild cases, as the toxic agent grows more intense and protracted in its action, probably the whole cortex is involved.

c.—If the gastro-intestinal poison be again of transient duration but of a very mild intensity, its action on the nervous system might be taken to explain certain attacks of migraine, sopor, vertigo, eclampsia of children, mental inertia, depression, hebetude, &c., &c., or other minor functional affections of the brain which are so often overtly associated with gastro-intestinal disturbances.

The connection between these minor so-called functional derangements of the nervous system occurring in the form of attacks is frequently so overtly associated with tangible derangements of the alimentary tract that it has always been more or less well recognized popularly. Celsus, (quoted by Albu) was well aware of the relation of cause and effect in some of these instances in saying, "*Omnis fere convulsio fit ab abdomine.*"

The explanation of this relationship between even these minor or transient nervous manifestations and the less unobtrusive gastro-intestinal disorders must be in the leaking into, or uncombated entrance into, the circulation of some latent toxic substance from the alimentary tract which poisons the nervous system. It seems only a question of degree in the severity or duration of the alimentary poison and the resultant neural degeneration which estab-

lishes the indefinite line of distinction between these minor transitory so-called functional manifestations of the nervous system and some cases which show the graver symptoms of actual psychoses.

Independent of actual lesions of the gastro-intestinal tract in children, the mere education of the alimentary system to fulfil its functions, is attended with experiments and errors. This is not infrequently accomplished in the developing infant without emphatic manifestations of transient poisoning of the nervous system evidenced most frequently by spasms or convulsions.

It is hardly to be expected in such instances that cytolysis occurs to any obvious or measurable extent. Or if the action of a poison of such a nature should produce initial degrees of cytolysis, this is promptly effaced by cytothesis upon the cessation of the poison.

It is very likely that the action of such poisons on the ganglion cells of the cortex results in a chemical change without parallel structural alterations. But, nevertheless, I believe that the symptoms of many of these minor so-called functional derangements of the brain or other portions of the nervous system are the expressions of the action of auto-poisons, particularly those of the gastro-intestinal tract.

This can be the more readily realized perhaps when it is recalled that the blunting and soporific effects of such drugs as the bromides on the nervous system are apparently induced by cytolysis of the ganglion cells. When this drug is given in large and continuous doses to rabbits it produces decided cytolysis of the whole central nervous system, as shown by Pandi.

The induction of sleep more particularly after fatigue is apparently a phenomenon of auto-intoxication for Mosso and Arbelous have demonstrated the toxicity of the blood in fatigued animals.

At this point it is necessary to allude very briefly to the matter of the selective action of poisons upon different regions of the nervous system, a subject which is approached with more detail in Section IX.

In a general way the selective action of different departments or regions of the nervous system by poisons determines the distinction between purely nervous diseases and mental diseases. In the two preceding examples of epilepsy and tetany we had under consideration poisons which exhibited a selective action upon the motor neurons, especially those of the brain. Hence the action of these poisons elicits in the typical cases a particularized, characteristic and definite group of symptoms due to the excitation of the motor zones of the brain.

In the succeeding varieties of the exhibition of gastro-intestinal auto-poisons this selective or localized action of the poison on the nervous system is reduced to a minimum. There is a general action of the poison to a greater or less extent on the whole cortex. If there be any selective action on the cortex in the beginning of the action of these poisons, such selective action very soon merges into a more or less general involvement of the whole cortex.

d.—In the case of a gastro-intestinal poison of considerable intensity, of brief duration but of general action on the brain cortex, the conditions are present for the development of mental symptoms of the acute type.

The generalized action of such a poison on the cortex according to various phases of intensity and rapidity of development might produce acute delirium, or a form of acute mania or melancholia of rapid development. These sets of mental manifestations are expressions of the toxic cytolyses of the cortical neurons.

Why cytolysis of the brain cells should manifest activity of the cortex in one case and cortical inertia in another case is difficult to fully explain. In the exhibition of the acute poisons of generalized action on the cortex we observe excitation of the cortical neurons in many instances. But in other examples the symptoms are indicative of an abrogation of the functions of these neurons.

Leaving, for a moment, these acute gastro-intestinal auto-poisons which act generally on the cortex, let us consider the action of better known poisons of similar properties in the acute bacterial diseases.

In the poisoning of the brain in the acute infectious diseases, we find expressions of excitation of the cortical neurons in some cases and a depression of their functions in other cases. The excitation of the neurons corresponds to the delirium preponderating in some of these cases, and the depression or annulment of the functions of these neurons corresponds to stupor, confusion and coma in other cases.

The delirium in these bacterial toxæmias of the brain implies a hyperkinesis of the cortical neurons, and the stupor, confusion and degrees of coma, a hypokinesis of these same neurons. These terms of hyper- and hypokinesis of the neurons are merely words of convenience to signify excitation and depression of the functions of the neurons.

The bacterial poisons express their toxic action on the brain in acute delirium or in analogues and degrees of coma. This is due to an embodiment of acute parenchymatous degeneration of the brain cortex with its attendant phases of cytolysis, cytoclasis and cytothesis.

I believe this to be the case, in the first place, by finding acute parenchymatous degeneration in the cortex in a case of typhoid fever.

Secondly, I find that this degeneration of the cortical neurons in typhoid fever is not essentially different from the changes in the cortical nerve cells associated with the acute delirium of sun-stroke, the delirium or coma of acute alcoholism or the coma of uræmia.

So the explanation of these mental symptoms of poisoning of the brain in excitation or depression of its functions whether the poison be alcohol, the toxins of typhoid fever, or the poison of sun-stroke, resolves itself again in this matter of cytolysis, cytoclasis, and cytothesis of the cortical neurons.

But how does this same process of cytolysis produce such different results as hyperkinesis, hypokinesis and akinesis of the neurons (loss of action or function of the neurons)?

This is a very complicated question, but I believe that the answer, in part, at least, may be stated as follows: The different expressions of the disturbance of functions of the neurons such as hyperkinesis, hypokinesis and akinesis are caused by differences in the mode of development of cytolysis. To what extent these different methods of cytolytic development are in turn due to variances in intensity, rapidity of development, duration, and inherent chemical peculiarities of the poison is difficult to say.

Apparently, rapidity of development in some instances is a factor of considerable importance in governing the character of the development of cytolysis of the neurons.

It seems that when the stages of cytolysis occur progressively and serially within a comparatively brief time in a given nerve cell, there is an acute excitation of that cell.

But if a part or all of these serial steps of cytolysis occur collectively in a given nerve cell there should be corresponding expressions of hypokinesis or akinesis of that cell.

I believe this to be the case, first, from studies of the anterior horn cells of the spinal cord in a case of brief poisoning with well marked clinical manifestations of hyperkinesis of these cells. These cells showed beginning or only moderately advanced and progressive stages of cytolysis in the resolution of the chromophilic plaques.

Secondly, studies of the anterior horn cells in peripheral neuritis with clinical symptoms of hypo- and akinesis of these cells not following previous hyperkinesis showed final stages of cytolysis. The cells were quite thoroughly bereft of their chromophilic granules. (Plate I, Fig. 2.)

Hence, observing in this latter case that the ultimate stages of cytolysis correspond to akinesis of the neurons, I am led to believe as follows: If these ultimate stages of cytolysis in a neuron are reached by a collective occurrence of the phases of the process, akinesis would be expressed in that neuron. If these same ultimate stages are attained by a serial progression of cytolysis, akinesis of the neuron would be preceded by hyperkinesis.

The attempt to explain the disturbances of function of the nerve cell in mental disease upon a parallel line of the structural basis of cytolysis of the neurons can not be given a fair presentment here. The matter is exceedingly complicated and takes the present narrative out of its main channels.

Reference, then, to toxic action on the brain wherein both hyper-, hypo-, and akinesis are more or less associated is omitted.

It might appear then, speaking broadly, that toxic delirium is associated with the serial progression of cytolysis. And, on the other hand, it would seem that stupor, coma and other expressions of hypo- and akinesis of the cortical neurons when developing as an individual group in acute or subacute poisonings of the brain are associated with a more or less collective or simultaneous occurrence of the stages of cytolysis.

This reference to the different expressions of functions of the neuron apparently associated with different modes of cytolytic development has been made for this reason. In returning to the subject of acute and subacute mania and melancholia we can see that such clinical antitheses are not necessarily associated with radically different groups or especial kinds of poisons or essentially different pathological processes.

Let us now return to the subject of the relation of these two forms of mental disease in connection with the acute gastro-intestinal class of poisons.

Some difficulty arises in attempting to harmonize the acute and subacute manias and melancholias with the duration factor in the action of poisons. It appears that the qualifications of acute and subacute with reference to mental diseases, especially to mania and melancholia, bespeak intensity of the symptoms rather than respect for the question of the rapidity of development. It seems that two instances of either of these diseases with equally intense symptoms are termed acute, with secondary regard for the question of the time of development. It becomes

difficult, therefore, to follow out the action of poisons based upon the time factor in these diseases, and to determine to what extent they should be associated with the auto-poisons of acute or subacute duration.

Intensity of a poison is an inverse function of its duration. It may be proper, tentatively, at any rate, then, to associate the acute and subacute forms of these two diseases with the corresponding varieties of auto-poisons.

Let us now consider if *acute mania* might be explained in a measure by being associated with an acute gastrointestinal poison of the properties noted under the class *d*.

In the action of such a poison we might understand how the stage of excitement or hyperkinesis would be parallel to progressive cytolysis which operates to a greater or less quantitative extent on the cortical neurons.

After the cessation of the poison and the cytolytic process has reached its qualitative and quantitative limits in the involvement of the cortical neurons, there should be a period of hypo- or akinesis governed by the extent of these limits.

This period should last a variable time pending the operation of cytothesis. Speaking generally, if cytolysis has approached its final stages, the stage of excitement is succeeded by a period of hebetude, confusion, stupor and general psychic depression.

The degree of the symptoms of this secondary period of psychic depression is proportional to the stage at which cytolysis culminates and to the number of neurons involved.

From theoretical considerations the rapidity of cytothesis should be directly proportional to the qualitative and quantitative extent of cytolysis.

If cytolysis be not far advanced and involve comparatively few neurons, cytothesis is rapid; if the reverse conditions attend cytolysis, the cytothetic process is more tardy and the depression period pending its action is more prolonged.

If the action of the poison be more prolonged so that

cytolysis passes over into cytoclasis, a certain amount of permanent damage of the brain results from the akinesis of the destroyed neurons.

If the poison then ceases, the cytolytic neurons which have been increased in number by this extra increment of duration of the poison may be repaired so that there is incomplete recovery.

If this be still more protracted, an increased number of neurons undergo destruction and so onward.

The prognosis, therefore, made possible by this factor of cytothesis is favorable in such cases.

Let us now consider the operation of such a poison (class *d*) in the production of *acute melancholia*.

Very much the same considerations are to be adduced as in the preceding example with regard to cytolysis, cytothesis and cytoclasis with this exception—the stages of cytolysis are probably produced more or less collectively instead of serially. There is no such marked secondary period indicating the culminative qualitative degree of cytolysis as in the preceding example. The hypokinetic or akinetic condition of the neurons is not preceded by the hyperkinetic period—or, if this advance condition be present, it is of such slight degree as to be practically out of consideration.

The prognosis, as in acute mania, is again made favorable by the factor of cytothesis from the comparatively brief exhibition of the poison.

The manias and primary melancholias, whether of acute or subacute or chronic character, it seems to me, are ear marks of auto-poisons. The body at large is not obtrusively diseased, as is the case with almost all other groups of poisons. The general process of exclusion narrows these affections down to an auto-toxic origin. They are not observed to be caused by bacterial diseases; and drugs or extrinsic poisons (acute mania from carbon disulphide poisoning in the artisans of rubber factories) which produce such conditions are easily detected. Acute delirium is the rule in bacterial toxæmias of the nervous system.

We may now consider the production of acute delirium from this conjectural poison of class *d*. As indicated above, acute delirium is more characteristic of bacterial poisons, and one or two extrinsic poisons, than of the auto-toxic group. Acute delirium of auto-toxic origin must be quite infrequent. I know of one striking auto-toxic origin, however, of acute delirium in insolation. The delirium in some of these cases is very severe indeed, and sometimes is practically identical with delirium grave.*

If such a gastro-intestinal poison of class *d* be severe and intense enough to produce the hypothetical case of acute delirium, the relations of cytolysis, cytothesis and cytoclasis are, in a general way, quite similar to the instance of acute mania discussed previously.

II.—*The subacute gastro-intestinal poisons.*

Any detailed discussion of the association of the subacute varieties of mania and melancholia with the above group of poisons is unnecessary from previous consideration of the action of subacute auto-poisons in general.

The relations of cytolysis, cytothesis and cytoclasis to the subacute forms are very similar to the acute forms of mania and melancholia.

Various numerical increments of cytoclasis, depending upon the duration of the poison, are more liable to occur. Cytothesis is also more tardy and prolonged.

The danger in the subacute forms of these diseases, if allowed to pursue their own course, lies in the tendency toward cytoclasis. This is why improvement may be frequently recorded instead of recovery.

In this very introductory explanation of the acute and subacute manias and melancholias, I have only the typical cases of each in mind.

If the steps of cytolysis of the cortical neurons be compared with the corresponding phases of disturbance of the functions of these neurons, and if it be further con-

* This is probably largely occasioned by occurrence in patients with an alcoholic history or in whom other factors mortgage the resisting and recuperative powers of the body, such as renal and hepatic disease.

sidered that cytolytic development may be different in different successive masses or groups of neurons involved; we then have an approach, at least, to an explanation of the departure from the typical types of these diseases.

For instance, in some of the subacute examples which partake of the nature of both mania and melancholia, I can conceive that at one time a group of neurons are undergoing the development of cytolysis which elicits hyperkinesis. But at a succeeding period in the same case I can equally well conceive of another group of neurons undergoing the development of cytolysis which corresponds to hypo- and akinesis. Thus in different degrees hyper-, hypo- and akinesis might alternate with each other.

Thus, in the melancholias which are preceded by a variable or diminutive stage of excitement, a primary set of neurons undergoes hyperkinetic cytotoxicity. Then, a second set of neurons undergoes hypo- or akinetic cytotoxicity. Or possibly in this same case, in a given set of neurons, the initial phases of cytotoxicity might be of the hyperkinetic mode or development, and the remaining cytolytic stages might be of the hypo- and akinetic qualifications.

In a case of subacute melancholia, preceded and succeeded by stages of excitement, the same line of explanation may be followed out.

Thus, mutations and alternations of cytolytic development in the same set of neurons, but especially *in successive masses of neurons* involved by poisons, are worthy of much consideration in the explanation of the symptomatic expressions in the acute, and especially in the subacute, and chronic manias and melancholias.

I hope in the future to attempt a representation of neurocytolysis as a differential controlling function of neurokinesis, by the algebra of series, or by parallel mathematical lines to express the serial increments of each process.

From this anatomical standpoint, which I am trying to put forth in explanation of the subacute manias and melancholias, the prognosis depends upon the duration of the poison and ought to follow these general lines.

If the duration of the poison be comparatively brief, the prognosis is good. The case slowly recovers. If the action of the poison be more protracted, improvement is more liable to be recorded than recovery. If the action of the poison be still farther protracted and becomes persistent, these subacute cases of mania or melancholia pass over into the bourne of the chronic form whence they may never return or recover.

III.—*The chronic gastro-intestinal poisons.*

This group of poisons must be exceedingly important in the production of chronic, progressive mental disease, for it seems at present as if such poisons were intangible and beyond human intervention to deflect the brain from its hopeless path toward destruction.

The mental diseases produced by these poisons begin under the guise of the subacute form—mania and melancholia, for instance—which then becomes inveterate, progressive and chronic from this persistence of the poison.

If a permanent lesion interferes with the functions of the organs concerned in intestinal absorption, or if a habit inducing perverted chemical reactions in absorptions is once established, the conditions are favorable for development of chronic poisons of the gut.

The latent poisons of the alimentary tube may then become potential and either persistent or confirmed and inveterate in their recurrent exhibition to the nervous system.

In the action of such a poison, the nerve cell is doomed, as it is ordained but once for the organism. Little by little, sometimes perhaps, by almost infinitesimal increments of chronic cytolysis, the nerve cells pass on to cytolysis. Meanwhile new masses of nerve cells start in on the same course.

In no other affections of the human body does the term insidious in its technical qualification of disease apply so forcibly as in the chronic auto-toxic forms of insanity, viz.: "A disease progressing to a serious condition with-

out (at first) exciting the notice or alarm of the patient or his friends." One might appropriately add in this connection, "and also without eliciting, through medical scrutiny, the source of the disease."

For such a poison, masking the danger of persistence with mildness, issues from the arcana of the somatic chemical forces, shackles the brain with Procrustean fetters and finally overthrows the nobility of the mind.

The operation of such poisons must eventually change the brain into a condition of terminal dementia.

It must not appear, however, that this more detailed consideration of the gastro-intestinal auto-poisons gives them an undue preponderance over other auto-poisons in the production of mental or nervous diseases.

These poisons have been used merely as a type to illustrate the action of acute, subacute and chronic auto-poisons in general with reference to toxic cytolysis, cytothesis and cytoclasis in the nervous system.

It is simpler to use these poisons for such an illustration, for we know something of the nature of their development. If only from partly theoretical grounds this is more than can be said of other groups of auto-poisons, for instance, those of intermediary metabolism.

Having considered cytothesis somewhat at length, I am impelled to attempt to stimulate a more comprehensive application of therapeutic measures based on this process. I would urge the importance of this point with more words; but, as cytothesis is the salvation of the nervous system in all forms of poisoning, a plea to directly aid this process by therapeutic measures may be made brief.

The primal aid to render the natural redemption of the integrity of the poisoned neuron in cytothesis is to modify the intensity or duration of the poison.

Hence, therapeutic measures, such, for instance, as have been adopted by Gibson (*STATE HOSPITALS BULLETIN*, Vol. I, 2), become very important indeed, and removed from empiricism. This observer treated a case of stuporous melancholia with the subcutaneous saline injections.

In this way, by controlling, if only temporarily, the duration and intensity of the poison, he aided cytothesis to such an extent that the symptoms improved considerably.

This and related therapeutic measures should outweigh, it would seem, from theoretical considerations, the value of drugs, for they strike at the root of the evil.

A second important question in connection with therapeutics of the insane relates to the *possible cytolytic action* of some of the drugs used in insanity.* If any of these drugs commonly used in the treatment of insanity produce effects by cytolysis, their administration demands much discrimination.

I can understand in a toxic disease that the substitution of an artificial poison in a drug for the toxine may be of benefit. But to add an artificial poison to a toxic substance acting in the nervous system is a sin. I have in mind the bromides more particularly and their injudicious empirical use in epilepsy.

With these general considerations of the action of gastro-intestinal auto-poisons on the nervous system, we may now consider a definite example of this form of auto-intoxication in tetany.

After experimental thyropravia, uræmia, insolation, myx-œdema, and Addison's disease, tetany is a very clear example of an auto-intoxication, and one which operates in a most predominant way on the motor cortex. From the fact that tetany is so frequently associated with gastro-intestinal derangement, there can be but little doubt that the auto-toxic substances are absorbed from either the stomach or the intestinal tract. The poison acts principally and selectively upon the motor segment of the central nervous system, especially its cortical portion.

* As this matter is going to press I find that the staff of the Utica State Hospital are engaged in observations of the anatomical substratum of certain points in mental therapy of the utmost importance. These lines of observation, which I am permitted by them to announce here, relate to the determination of the experimental cytolytic action of some of the drugs used for neural diseases, particularly the bromides. Secondly, these observations relate to further determination of data respecting the value of hydrotherapeutic or other anti-toxic measures in insanity.

Dilatation, ectasia and atony of the stomach, so often associated with tetany, give rise to conditions favorable for an auto-intoxication. The food is retained in the stomach for an undue length of time, and gives origin to a number of secondary products which are not present in normal gastric digestion. The hyperacidity of the gastric juice under these conditions of the stomach entirely modifies the whole chemical process of gastric digestion. The peptones are produced in excessive amounts. They remain in the stomach subject to an unduly prolonged action of the hydrochloric acid, and it appears under these circumstances, that certain poisonous bodies may be formed, called pepto-toxins. The isolation of such suspected toxic substances in the gastro-intestinal tract and the production of tetany artificially in animals through the exhibition of such toxic substances, however, has not been definitely accomplished.

Bouveret and Devic isolated from the contents of the stomach in three cases of tetany, by Brieger's method, a substance which produced spasms. They were unable, however, to rigidly exclude the possibility that these poisonous compounds might have been produced in their technical methods of procedure. Ewald and Jacobson isolated from the urine of a patient with tetany, by the previous method, an alkaloidal compound which unfortunately was not tested for its toxic properties. Albu was able to demonstrate in the same patient that an alkaloidal body existed in the urine during the attacks, but was absolutely free from the urine in the periods between the attacks. The presence of these substances in the urine is a step nearer to the real demonstration of the circulation within the body of some absorbed poison of an auto-toxic nature in these cases of tetany; for to exist in the urine it would appear that the poison had been excreted from the blood.

The crucial experiment, however, is to test the toxic qualities of the blood of the subjects of tetany. If the blood serum be injected in animals and the symptoms of tetany can be reproduced in this way, we have a physio-

logical demonstration of the toxic substance that will place tetany on the auto-toxic basis with certainty.

It is a matter of clinical experience that many cases of tetany are accompanied by disorders which make most favorable conditions for fermentative and other abnormal products in the complicated chemistry of the gastro-intestinal tract to gain access to the circulation. Yet the disease ought not to be considered as entirely due to the auto-toxic substances derived from the alimentary tract.

Probably a number of poisons other than those derived from disordered conditions of the alimentary tract are capable of producing the symptoms of tetany. Tetany seems to be due to poisons which act primarily on the motor cortex. If this be the case, certainly a very large variety of poisons is capable of acting in this selective way upon the motor segment of the brain; for instance, tetany in animals may be elicited by injections of chloroform and ergotin. Finally, tetany is not infrequently observed accompanying myxœdema and seems to be associated with the accumulation of mucin (?) in the connective tissues. Mucin is to be regarded as an intermediary product of general tissue metabolism in the organism, (*Poehl's Gewebsathmung*) and if it is allowed to accumulate in the body, it might act as a toxic substance, or perhaps merely indicate results of the action of some other poison. Thus, some examples of tetany may be ascribed to the action of toxic products in nowise connected with disturbances of the alimentary canal.

Furthermore, the form of auto-intoxication resulting from the removal of thyroid glands in dogs seems to be a perfectly typical example of a very severe form of tetany. The dogs have tonic contractions of the muscles, which soon become universal; there are incessant fibrillary tremors, and if the thyroid has been completely removed, the symptoms are accompanied with a fatal result in a very few hours or days. Through the courtesy of Dr. Cunningham of the Department of Physiology in the College of Physicians and Surgeons, I have had an opportunity of studying the

nervous system in several cases of experimental thyropravia, with the result of finding an acute universal destructive degeneration of the cortical ganglion cells.

The appearances of such cortical cells are quite like the cytoclastic cells shown in Figure 2, Plate I. Apparently the poison in these cases of experimental thyropravia, in the beginning stages of its production, exerts a selective action upon the motor segment of the cortex. But as the poison or poisons accumulate, and become larger in volume, or greater in intensity, spheres of the cortex beyond the motor segment are progressively involved. And, finally, at the death of the animal, there is this universally acute destructive degeneration of cortical cells as an expression of the chemical reaction between the poison on the one hand and the constituent elements of the ganglion cell body on the other.

In connection with the relation of some forms of tetany to the group of auto-intoxications caused by lesions of the thyroid gland, it is interesting to note that Kobert calls attention to the fact that mannin, a constituent of ergotin, which elicits attacks of tetany when injected in animals, belongs to the carbohydrate group, and resembles mucin. That the poison of tetany probably, when exceptionally virulent in quality or large in quantity, acts upon other spheres of the cortex beside the motor segment, is shown in the case reported by Loeb. This was associated with ectasia of the stomach, but besides the purely motor symptoms of tetany, there was a distinct invasion of the sensorium. There was delirium, apathy and mental hebetude.

The case reported by Wilgus in the second number of the STATE HOSPITALS BULLETIN is exceedingly interesting, for it certainly appears to be a distinct example of an auto-intoxication due to a very severe grade of intensity of the toxic substance. In this case there was not only the purely motor phenomena of tetany in a most marked and intense degree, but it was also associated with insanity. Nor does the rise of temperature in Wilgus' case interfere with the interpretation of the symptoms as an expression

of an auto-intoxication. It will be shown presently that sun-stroke itself, with its accompaniment of abnormally high temperatures, is a most brilliant illustration of an auto-intoxication. I do not hesitate to believe that in the case of Wilgus the results of the action of the poison upon the cortical cells would have shown changes quite the counterparts of the figures 1 and 2, in Plate I. This author's case, in many ways, is quite the counterpart of the severe, rapidly fatal form of auto-intoxication, which produces tetany such as is seen in dogs deprived of the thyroid gland. It should be remembered in this connection, as noted above, that such dogs die, provided the thyroid be completely removed, in a very few days, not exceeding five to ten.

To sum up, tetany seems undoubtedly to be due to an auto-intoxication; when the poison is small in volume or mild in intensity it exerts a selective action upon the cortical portion of the *kinetomeric* system, (see section IX), and remains limited, apparently, to the motor zones of the cortex. Such are the cases of tetany associated with the majority of instances of gastric ectasia, or other derangement of the gastro-intestinal tract. When the poison becomes more abundant or more intense its action, while predominantly and initially exhibited by a selective affinity for the motor segment of the cortex, it extends beyond this sphere and involves the ganglion cells of the whole cortex. Such cases as these are of the type reported by Wilgus, of the experimental thyropravia in dogs.

It is difficult to determine to what extent tetany may be produced by an inhibition of the functions of the organs which act as a barrier in antagonizing or nullifying the toxic substances absorbed from the gastro-intestinal tract under normal or pathological conditions of digestion. The liver is believed to act in such capacity. And, it is possible, then, that in some cases of tetany in which no visible change in the gastro-intestinal tract has been found on autopsy, minute changes in the liver may be responsible for the absorption into the circulation of toxic substances which, under normal conditions of the liver, are nullified in that

organ. The urgent test to apply for the auto-toxic nature of tetany is the injection of the blood serum in test animals. And this should be done with all of the conservatism, control experiments and caution that such a procedure demands in the testing of the toxic power of the blood in auto-intoxications in general.

I may repeat again, that the obscure character of the auto-toxic substances in general and the obscure character of the poisons in the extensive list of insanities probably produced by auto-intoxications, does not interfere with the perfectly definite morphological studies which can now be made. In case after case of mental disease it is my belief that we shall see these traces of the action of a poison in these ever-recurring mutations of cytolysis and cytoclasis of acute, subacute or chronic production.

There still remains to be considered beyond this more or less definite category of auto-intoxications, such as uræmia, thyropravia, myxœdema, tetany, and the later neural symptoms in Addison's disease, a number of obscure affections of the nervous system, which point more or less strongly toward an auto-toxic origin. These cases are as yet very few in number, and their auto-toxic character rests only upon an inferential basis, but little by little such cases will accumulate in number. Many of the psychoses will probably be added to them, and in the course of time, there will be a gradual accumulation of more definite proof of their auto-toxic character.

Examples of these more obscure auto-intoxications of the nervous system are cases reported by Pick and Séglas. Both of these cases appear to have been associated with auto-intoxications from the alimentary tract. In Pick's case, there was an atonic condition of the stomach, associated with many neurasthenic symptoms, manifestations of physical and psychical depression, headache and rapid heart action. These symptoms seem distinctly due to a poisoning of the nervous system by an auto-intoxication which took place through the stomach, for the symptoms disappeared absolutely under an antifermentative therapeusis.

I recall the case of a man of intellectual primacy who has had attacks of mental depression of moderate severity which have occurred over a period of years.

These attacks are so obviously associated with corresponding attacks of gastro-intestinal derangement that the man himself has long since learned to associate the two things together. He can predict the occurrence of these gastro-intestinal crises by the preceding attacks of mental depression.

The attacks of mental depression have no relation to any adverse condition of his affairs, and almost border on melancholia. During these attacks, lasting four or five days, he is extremely depressed, uncommunicative, unable to transact business, and absorbed by the untoward pessimistic attitude which everything in the outside world seems to assume. All of this disappears with the occurrence of the gastro-intestinal crises.

This may seem a common-place episode in our narrative, but it appears to me, that it is merely a question of degree between such an instance and the initial symptoms of some cases of acute melancholia even with suicidal tendencies.

Séglas reports a similar case, and sees an analogy and sustaining proof in the auto-toxic nature of some of the psychoses and functional nervous disturbances in that extrinsic poisons, for instance, lead and alcohol, lead to similar forms of mental disturbance.

And I may add from cytologic studies of the nervous system, in both lead and alcoholic poisoning, that the effect of these poisons on the nervous system is not essentially different from that of several auto-intoxications, namely, uræmia, thyropravia and insolation. Both the extrinsic poisons and auto-intoxications, as well as other forms of poisons, show the same result, namely, various phases of parenchymatous degeneration of the nervous system.

Evidence by exclusion is certainly accumulating that a very rare disease of the nervous system, known under the term of *periodic family paralysis*, is to be ascribed to an

auto-intoxication. The disease was first described in 1874, by Hartwig, and has since been observed by Westphal, Oppenheim, and a number of others. This disease consists in the sudden appearance of paralysis of the extremities at the most irregular intervals. After several hours, or days, this paralysis disappears entirely. There is also corresponding to this temporary paralysis of the extremities, a correlated disappearance and return of the electric excitability of the muscles.

Goldflam ascribes this unique nervous affection to an auto-intoxication. In his case a seventeen year old boy had brief attacks of general paralysis, which lasted usually two days, and occurred about once a week. These attacks began by weakness in the legs in the evening, and in the course of the next morning the entire body, with the exception of the head, was paralyzed. Sensibility was unaltered and reflexes diminished. At the end of the attack, there was extreme sweating, and motility returned in the reverse order of its appearance; it reappeared first in the arms, then in the trunk, and finally in the legs.

In the family of the mother of the patient eleven members exhibited the same symptoms, both males and females being attacked in the same way. The disease generally began at the age of between fifteen and twenty years. Goldflam injected the urine of the patient in the ear vein of rabbits shortly after the attack, and also in the interim, and found that the poisons of the urine were much greater during the attack. Between the attacks the urine was hypotoxic, as compared with the condition during the attacks, which was hypertoxic. If these results with the urine should be corroborated, they would indicate the poison is not of the "retention group of normal waste products," but that the poison develops *de novo* within the body. If this affection of periodic family paralysis is an auto-intoxication, it is exceedingly suggestive in exciting suspicion of the auto-toxic nature of the psychoses of periodic development.

It is interesting, in connection with the toxic basis of

epilepsy, to refer to the experiments of Griffiths, who found in the urine of an epileptic a leucomaine which produced general tremors, vomiting, mydriasis, and, eventually, death when injected into dogs. Voisin records hypertoxicity of the urine after epileptic attacks.

Rachford, of Cincinnati, has also isolated, in the urine of a patient with epileptiform manifestations, some of the xanthin and paraxanthin bodies which produced toxic symptoms when injected in animals. The *increase of neuroglia cells in the sub-cortical zones*, which I have found in several cases of epilepsy, does not at all interfere with the supposition of the auto-toxic origin of this affection. On the other hand, it is a factor in favor of this basis of epilepsy, for I can demonstrate that one of the expressions of a chemical reaction between a toxic substance and the more lowly organized neuroglia cells and the mesoblastic connective tissue cells of the nervous system is karyokinesis. Hence, after the periodical momentary contacts of the nervous system with the poison extending through months and years, a proliferation of the neuroglia cells is to be expected.

How much of a selective action the poisons which produce epilepsy have upon different spheres of the cortex, or to what extent they operate upon the whole cortex uniformly, are questions which are most interesting, but about which very little can be definitely said at present. It would seem most probable, at any rate during the later periods of epilepsy, that the toxic substances producing epilepsy operate upon the whole cortex at large.

It has been suggested that Landry's paralysis is also an example of auto-intoxication of the nervous system. This, perhaps, has been done, however, because of the inability to apply any more plausible explanation of the nature of this disease. The anatomical changes in Landry's paralysis offer no impediment to the acceptance of this view. It would be best, however, to exhaust the possibilities of a bacterial toxæmia as a cause for Landry's paralysis before placing the disease in the category of the auto-intoxications.

The auto-intoxications due to lesions of the kidneys must be very important factors indeed, in the production of mental diseases. Perhaps the clearest and simplest example of the profound damage that is liable to be wrought upon the nervous system in the acute renal intoxications is eclampsia gravidarum. Here is again a signal example of the very prompt effects on the nervous system of a severe, intense poison, and it is accepting but little responsibility to predict that the examination of the cortex in such a case of eclampsia will disclose an acute degeneration of the ganglion cells practically quite the same as shown in Plate I. This acute, intense, violent poison ought to cause a degeneration of the cells with a tendency toward the destructive type. This degeneration of the cells is probably present in all cases of eclampsia of any degree of severity, but, as has been repeated so often, acute degeneration of the ganglion cells is not necessarily destructive. The cell may recover, both in structure and function, from such a degeneration, but, on the other hand, if the poison be too severe or have too persistent an exhibition, the cell may become permanently destroyed. This is the reason that many of the cases who do recover from eclampsia have a permanently damaged cortex from the acute destructive degeneration of the ganglion cells, and ultimately pass into the hospitals for the insane with one form or another of mental disease.

Very much the same remarks are applicable to the acute uræmias. In this condition there is also this same acute degeneration of the ganglion cells as an expression of a chemical reaction between the cells and the toxic uræmic products. In most of these cases of acute uræmia, however, clinical history enables one to justly infer that the quality or quantity of the poison is such that, when it disappears, there may be a restitution of the ganglion cell—a recovery both in function and structure.

The chronic or persistent forms of auto-intoxications from the kidneys are more complicated and probably have a most important bearing as a direct or indirect factor in the production of mental diseases. In the first place, the

intermittent and repeated attacks of uræmia are compatible with a degeneration of the recovery of the ganglion cell after the cessation of the uræmic products. But, as in the case of the exhibition of alcohol, the recovery of the cell can not be expected to go on indefinitely. If there is a persistent exhibition of the uræmic poisons, as in chronic alcoholism, eventually the ganglion cell ought to take on some form, however slight, of permanent damage to its structure and function. In uræmic coma from chronic Bright's disease, I have been able to demonstrate acute degeneration of the cortical ganglion cells practically similar to that shown in Plate I, Fig. 1. In another case wherein convulsions were a more marked phenomenon of the uræmic condition than coma, only the initial phases of an acute degeneration could be demonstrated in the cortical ganglion cells. Thus, probably, to a degree which is slight, chronic renal auto-intoxications damage the ganglion cells directly.

But a second, although indirect, factor of renal disease, in modifying the action of other poisons in general upon the nervous system, is of very great importance. This consists in the impairment of the eliminative capacity of the kidneys when other poisons are introduced into the body. When the eliminative capacity of the kidney is impaired, and when poisons, either from an extrinsic, or bacterial, or other auto-toxic source, are present in the body, they become invested with much greater significance than in the normal individual. Such poisons introduced into an individual with chronic kidney disease operate with a much more damaging effect, especially on the nervous system. They operate for a longer period of time by reason of the impairment of the eliminative powers of the kidney, and the duration of an exhibition of a poison to the nervous system is the fundamental factor in determining whether the resultant acute degeneration shall have a recuperative or destructive termination on the cells.

It is not difficult to realize that a poison from an extrinsic source, a bacterial toxin, or an auto-toxic poison,

operates with greater destructiveness on the nervous system in individuals with diminished capacity of elimination through the renal organs. This was shown most strikingly in our observations on sun-stroke at the Pathological Institute during the past summer. Quite uniformly the cases which failed to recover from the auto-toxic poisons of sun-stroke were individuals whose kidneys were considerably damaged. In other individuals apparently whose kidneys were normal, the poison or poisons were seemingly rapidly eliminated, and these cases escaped or recovered from the serious acute degeneration of the cortical ganglion cells. In the group of cases with kidney lesions the poison apparently remained in the body, and as a result there was acute degeneration of the ganglion cells with a destructive tendency.

The auto-toxic substances in sun-stroke are such violent and intense poisons that the whole question of recovery or death of the patient depends upon rapid elimination of the poison by the various excretories. I can think of no other disease where a normal kidney acts as a greater safeguard in eliminating the poison of such a profoundly virulent type. Apparently only a few hours are necessary, if the elimination of this poison be interfered with, to produce death or a permanent damage to the nervous system, such as we see in the cases in the hospitals for the insane, who owe their impaired mental condition to an acute, destructive degeneration of the cortical ganglion cells after sun-stroke.

Thus the importance of the kidneys in auto-intoxications and in other groups of poisons in the production of mental diseases may be regarded from two standpoints. In the first place, the direct action of retention of renal intoxicants on the nerve cell, whether of acute or chronic exhibition, is to be regarded. Secondly, the indirect but very important factor which disease of the kidney becomes in interfering with the elimination of other groups of poisons, whether of an extrinsic, bacterial or auto-toxic nature, must be taken into consideration.

Poisons, whose action upon the ganglion cells might

readily be recovered from in a normal individual, become much more dangerous to the integrity of the nervous system by reason of their protracted action in individuals with damaged kidneys. Thus, for instance, in alcoholism, typhoid fever, or influenza, the liability to damage of the cortical cell is greatly enhanced by diminished eliminative power of the kidneys.

Finally, in chronic lesions of the kidneys, it is not only a question of interference with the protective power of the kidneys in eliminating toxic substances in general, but the condition permits of a combination of poisons, when some other disease becomes engrafted on the body. There are, in the first place, the auto-intoxications due to the accumulation of materials which are imperfectly excreted by the kidneys; then, if a bacterial toxine be developed in the body in such a case, there is a mixture of two groups of poisons. This brings up one of the most difficult of all of the groups of toxic substances mentioned in the initial paragraphs of this text, viz.: combinations of auto-intoxications and bacterial toxins.

It is comparatively easy to understand the action of a single poison circulating in the blood, and how such a poison would exert a chemical action upon various body cells, especially the brain cells, and the manifestation of this chemical reaction in acute degeneration. But very rarely in any of the toxic diseases is the case as simple as this. In such a disease, for instance, as typhoid fever, there is not only the comparatively simple action of the toxins, elaborated by the typhoid bacillus, but in addition to this, it must be taken into consideration that disturbance of the kidney functions induced by the action of this toxin on the kidney cells exists. Thus, there is, therefore, a combination of poisons which contains at least the toxine of the typhoid bacillus, plus a form of auto-toxic poison, due to the secondary involvement of the kidney. In the same way in all of the continued fevers or acute infectious diseases, there would seem to be indicated the primary bacterial toxin, associated with all of the auto-toxic products,

resulting from the derangement of the various secretory organs which have been secondarily damaged by the primary bacterial poison. From this point of view, any of the acute bacterial diseases becomes a very complicated matter, indeed, by reason of the fluctuations in the volume or intensity of the primary poisons and the mixtures of the bacterial toxin with the various secondary auto-toxic products.

Diseases of the kidney must place a very heavy mortgage on the nervous system in the action of poisonings which may happen to the individual in the future.

Before leaving this introductory text upon the relation of the auto-intoxications to the nervous system, the subject of *eclampsia infantum*, *myasthenia gravis pseudo-paralytica*, *diabetic coma* and *coma carcinomatosum* deserve mention. The eclamptic symptoms of children receive the best explanation from the auto-toxic basis. Reflex irritation, dentition and vascular fluctuations in the brain and the like, are certainly vague, indefinite explanations of the eclamptic seizures in children, compared with the action on the motor cortex of auto-toxic substances, derived principally from the alimentary tract. Nor is it necessary to conceive that there is any inherent weakness on the part of the brain in children to explain the frequent occurrence of convulsions. The explanation of the frequent occurrence of convulsions in children would seem to be rather due to the fact that they are subject to more frequent dietetic errors or digestive derangements than in the adult, and have not completed their education of the functions of the gastro-intestinal tract. Herter considers this factor in the etiology of *eclampsia infantum* so uniformly a causative agent, that he bases the success of his antiseptic therapeutics of the gastro-intestinal tract thereon.

Albu relates a case of a ten year old boy in which moderately severe cerebral symptoms depended so definitely on an auto-intoxication of the gastro-intestinal tract that it is well worth relating here. The boy had frequent attacks of convulsions of such a grade of severity, together with a

loss of consciousness, that they well answered the description of hystero-epilepsy. As a matter of fact, these symptoms were due to a gastro-intestinal auto-intoxication, and were accompanied by a dilatation of the stomach and were regularly preceded by digestive disturbances, which were very easily controlled by treatment. The boy left the hospital several times. As long as the treatment of the gastric disorder was maintained the boy was absolutely free from the attacks. For some time, as often as he left the hospital, he returned in a brief period with the same set of symptoms.

This very commonplace instance, however, of the action of auto-toxic products from the gastro-intestinal tract shows how almost synonymous are auto-intoxications and symptoms and diseases of the nervous system. Practically the only symptoms in this case were those of the nervous system. The local symptoms were almost unobtrusive.

Diabetic coma is again an example in all probability of an acute degeneration of the ganglion cells, due to the action of an auto-toxic poison, as shown in Plate I. The same is to be said of the coma, often associated with carcinoma of the gastro-intestinal tract, and coma occasionally associated with severe anæmia, miliary tuberculosis, cirrhosis of the liver, senile cachexia, etc.

Apparently it is possible for auto-toxic products to exert a selective activity on the *muscular system*. Jolly describes a symptom-complex under the name of myasthenia gravis pseudo-paralytica, which seems justifiable to place in the category of auto-intoxications. The essential feature of this disease consists in the periodic appearance of paralytic flaccidity of the muscles of the entire body, although the muscles of the extremities are most distinctly involved. There is very rapid fatigue of the muscles after exertion. Although muscular activity returns after a period of rest, renewed exertion is accompanied with the same peculiarly rapid fatigue. Electric excitability corresponds uniformly with the spontaneous stages of rest and fatigue in the muscles. The serious feature of the disease is the in-

volvement of the muscles of deglutition and respiration, which may lead to a fatal termination. Whether the auto-toxic substances have their origin in the muscles themselves in these cases, or whether they are derived from other sources, is at present an indeterminable question.

The most satisfactory illustration in many respects of the whole groups of auto-intoxications is the subject of insolation. The investigations on sun-stroke at the Pathological Institute in the past summer, during the great outbreak of this disease in New York City, places the auto-toxic nature of this disease beyond any conjectural basis. It is somewhat remarkable when the tendency of so many writers is to place numbers of diseases in the category of auto-intoxications upon such insecure proofs, that sun-stroke has not received more attention from the auto-toxic standpoint. For it is the most brilliant and straightforward example of an acute, intense, virulent poison originating within the body, which acts most rapidly and violently upon the nervous system.

During the previous summer an examination of a case of insolation convinced me that the acute degeneration of the cortical cells must be due to the action of a poison. And the memorable outbreak of the affection during the past summer, in New York City, lasting over a week, afforded a unique opportunity for studies to substantiate the toxic theory of the disease indicated by the microscopic appearances in the case of the previous year. Through Dr. Phœbus Levene, Associate in Physiological Chemistry at the Pathological Institute of the New York State Hospitals, an extended series of studies of the effects of the body fluids and excretions of living cases of sun-stroke were made on animals. Repeated injections of the urine in rabbits from several different cases showed uniform hypotoxicity just after the occurrence of the sun-stroke. Injections of the cerebro-spinal fluid and ventricular fluids of the brain from the fatal cases produced lethal results in some of the animals. But, inasmuch as these animals died when not under observation and some hours after the injection,

the results of these experiments can not be given much significance one way or the other.

Injections of the *blood serum*, however, taken from two patients during the period of hyperpyrexia, gave most prompt and decisive results. Quantities from five to eight cubic centimeters in volume of this blood serum injected in the ear vein produced uniformly lethal results in five animals in succession within 45 to 60 minutes after the injection. The animals had very violent convulsions, which were usually so severe that they died in the midst of the attacks within four or five minutes. There were clonic and tonic convulsions of all four extremities, opisthotonos, and, at times, propulsions forward of the whole body. The animals also had a rise of temperature of two or three degrees in the rectum shortly after the injections of the fluid. This rise of temperature, however, we do not regard as indicative of any particular significance, since it may occur after injections in the ear veins of rabbits with a variety of reagents. It is only just to add that in recording the fatal results in the animals from the injection of the blood serum, entirely accidental factors which may produce death from the mere operative procedures were carefully eliminated in the experiments. Any one who has had any extensive experience in injecting foreign substances into the ear veins of rabbits, will have noticed not infrequently, that fatal results occur which are due to manipulative procedures, and can not at all be ascribed to the action of the material used. But there was no mistaking the cause of death which occurred so uniformly in these animals in succession. This result is in consonance with the hypothesis that the rapidly fatal course in severe cases of sun-stroke, is due to an intense, rapidly acting poison, circulating in the body fluids. If this view be correct, it was to be expected, as was in fact the case, that even the small quantity of blood serum used in the rabbits would produce experimentally this rapid, prompt and fatal effect.

Finally in the fourth set of experiments urine from con-

valescing patients was injected into the blood circulation of rabbits. This was found to be most decidedly hyper-toxic. Dr. Levene's experiments, therefore, seem to indicate that some toxic product is retained within the body during the initial periods of insolation. This toxic substance gains access to the blood and finally it seems that the poison disappears from the blood and is excreted by the urine.

It is not too much to say that the virulence of the auto-toxic poison in some cases of sun-stroke is fully as rapid and violent as snake venom and considerably resembles its action. Cases of sun-stroke which entered the hospitals with purple, swollen faces, rapid and very much enfeebled heart action, and profound collapse, with death occurring within one to two hours, are surely examples of the effects of the most violent poisons that we know of. Such a poison seems immediately to act upon the ganglion cells which govern the heart and which manage the vaso-motor apparatus. This brings about such a rapid suspension of the most vital functions that the body hardly has a chance, so to speak, to react against or eliminate the poisons.

It is not within the confines of this address, however, to give more than the most tentative review of these investigations on sun-stroke. The fuller exposition of this work is left for a future number of the BULLETIN.

I have instanced sun-stroke as a most straightforward example of auto-intoxication in this connection to show you again that the traces it leaves on the nervous system are most tangible and distinct. It is, again, as we shall see so often repeated in acute toxic diseases of the nervous system, generally, a manifestation of acute degeneration of the ganglion cells, such as is shown in Plate I. And if these changes in the ganglion cells be carefully considered, the whole clinical history of sun-stroke—and this consists largely in manifestations of the nervous system—becomes clear and distinct.

The delirium, convulsions, coma, the acute maniacal con-

dition, practically equivalent in some cases to conditions of delirium grave; the tetanus-like symptoms, the opisthotonos, tonic and clonic spasms; the clinical pictures in others which simulate the manifestations of hydrophobia; and, finally, the permanently damaged mental status which is left behind in many victims of sun-stroke who make their way into the hospitals for the insane:—all of these things can be clearly interpreted by the changes wrought in the ganglion cells by this auto-toxic poison similar to the changes shown in Plate I. In the cases of sun-stroke which terminate in one or another form of insanity, the acute degeneration of the cortical cells has gone on to a destructive phase. In the cases which recover in a few hours there is probably little, if any, degeneration in the cortical cells. There is the temporary action of the poison on the groups of ganglion cells which manage the heart and vaso-motor systems, and when the poison is removed the recovery of the individual is comparatively rapid, and between these two extremes of cases which recover rapidly and cases in which the nervous system is permanently damaged, there are all sorts of gradations in the degree of severity in the acute degeneration of the nervous system.

The source of this auto-toxin in sun-stroke is unknown to us, as well as the relations of the poison to the production of the hyperpyrexia, and also its relation to the cessation of perspiration prior to and during the onset of the attack of insolation.

The determination of the uro-toxicity in these researches on insolation was controlled, as far as possible, by chemical analysis of the urine. It is to be made clear, however, that we do not attach any value to these uro-toxic experiments, other than that of a temporary and subsidiary nature in formulating the auto-toxic basis of sun-stroke and explanation of its symptoms.

The auto-toxic causation of sun-stroke is based on the toxicity of the blood serum taken from living cases, conjoined with the structural changes in the ganglion cells which show the handiwork of a poison.

These uro-toxic experiments in sun-stroke, then, are instanced with the distinct understanding that we refrain from making any positive deductions from them; they are tentative and introductory to further more comprehensive determination, which we hope to make at the first future opportunity

Uro-toxic determinations, to be of value, should be made in a large number of cases with very careful attention to the clinical history, with a uniform method in a large number of animals, attended by thorough microscopical examinations of these test animals.*

We now come to the consideration of the testimony of the auto-toxic basis of mental diseases, along the lines of physiological chemistry, and the physiological testing of the toxicity of the body fluids in animals. I think that a very just presentment of this question may be given in saying that some of this testimony points toward the auto-toxic basis of mental diseases, but that it does not constitute any sort of evidence, for the cases are too overwhelmingly few in number. The application of these two lines of research to the toxic basis of insanity is simply in its infancy. The few isolated cases studied from these standpoints are not only insufficient in number, but the experiments on the given cases are not sufficiently multiplied, nor are they repeated often enough at different epochs of the disease. Such observations are in no state of development to attempt any synthesis of the results.

Some of the results of the testing of uro-toxicity in insanity seem very striking and convincing.

Mairet and Bosc, and also Brugia record a hypertoxicity of the urine in psychic diseases and even indicate an opinion that animals injected with the urine of patients suffering from melancholia exhibited certain parallel psychic symp-

*I enjoy this opportunity of presenting acknowledgments of the cordial collaboration of the coroners of New York City and their deputies, especially Doctors Otto Schultze and Philip O'Hanlon, and of the several attending physicians and internes of Bellevue, St. Vincent's, New York, Manhattan, Presbyterian and Gouverneur Hospitals, which rendered these investigations on sun-stroke possible.

toms, such as somnolence, coma and depression, and, on the other hand, when injected with the urine from patients in an excited or maniacal condition, exhibited contrarywise local or general convulsions, etc.

At the French Congress of Mental Medicine at La Rochelle, in 1893,* Régis and Lavaure record diminution of the toxicity of the urine in maniacal conditions and an augmentation of uro-toxicity, on the contrary, in melancholic conditions. Further, the urine of maniacs and that of melancholiacs, have a different action on the animals in which they are injected. The former causes chiefly excitation and convulsions, and the latter depression, inquietude and stupor.

While I am profoundly convinced of the great importance of auto-poisons as a cause of mental diseases, by using the eliminative method in studies of general toxic neural cytolysis, I can not regard such results as these without considerable scepticism until corroborated by a very large number of similar results.

The trouble is, given considerable enthusiasm and an unconscious impulse to attain certain results in injecting the fluids of the human body, the smaller lower animals are very accommodating indeed, especially rabbits. It takes considerable experience to guard against error in all of this animal experimentation in showing the physiological effects of auto-toxic products by injecting the fluids of the human body. All sorts of results may be obtained and be interpreted at the pleasure of the observer. I venture to express my opinion that in mental diseases especially the testing of the toxicity of the fluids of the human body by the physiological effects on animals is one of the most difficult and subtle departments of physiological chemistry, and requires a most practiced and experienced observer to properly interpret the significance of the results.

In the discussion at the La Rochelle congress Ballet and Séglas, while realizing the probable importance of the

* Abstracted in the *American Journal of Insanity*, Vol. L.

auto-toxic basis of insanity, take a much more conservative and commendable position in regard to the testimony of uro-toxic determinations. The contradictory and confusing results of Ballet and Bordas in regard to the relation of the presence of ptomaines in the urine to uro-toxicity, exemplify very well the extreme caution requisite in making deductions from uro-toxic determinations.

I have in mind, also, the possibility of the occurrence of toxic products in the urine from the materials formed by disintegration of the nervous system. Thus, in a chronic auto-intoxication of the nervous system, the urine may indicate the presence of the primary auto-poison, but it may also contain, in addition, substances which come from the cytolysis or cytoclasis of hordes of neurons.

In the evolution of our knowledge of the causation of any disease or set of obscure diseases, there appears always to be a period of speculation, which seems to do fully as much harm as good; and the present condition of the auto-toxic basis of psychic diseases is very tempting for speculation. The wisest plan for us apparently to pursue, at present, is to examine the nervous system with cytologic methods and demonstrate the effects of the supposed auto-toxic substances in these psychic diseases on the ganglion cells.

Hand in hand with this, a large percentage of the energy of the staffs of the State Hospitals should be directed toward the *systematic* accumulation of the experimental determination of the toxicity of the body fluids, particularly the urine and blood, in the insanities.

But repeated systematic observations with a large number of animal experiments in relatively few cases in varying conditions of the clinical manifestations, should replace scattered, unsystematic experiments in a large number of cases. An enormous amount of work remains to be done along this line.

We must try to know all of the variable exhibitions and fluctuations in intensity and duration of these auto-poisons in insanity by uro-toxic determinations.

The modification which Gibson (BULLETIN, VOL. I, No. 2) was able to produce by subcutaneous injections in a case of stuporous melancholia by diluting the body fluids and stimulating the eliminating power of the emunctories, may be regarded as much better evidence of an auto-intoxication than many of the instances where psychic diseases are so positively ascribed to auto-intoxications on very unreliable premises of uro-toxic determinations. These are unreliable because both the clinical cases and the experiments based upon them are too few in number.

A discussion of the subject of the action of auto-intoxications of the mother upon the developing foetus is very important in this narrative, which attempts to consider some points in the toxic pathogenesis of mental disease.

The subject must be dismissed, however, with the allusion that it must be one of the factors and probably a very important one in the heredity of insanity.

Auto-poisons must, perhaps not infrequently, play an important part in the production of protal defects in the nervous system. If this be assured, several diseases of the nervous system known (Little's disease or congenital idiocy) or suspected to be due (some forms of epilepsy (?), Huntington's chorea) to protal defects of the nervous system may be really due to the action of auto-poisons. The so-called group of "protal diseases of the nervous system" may then be divested of their obscurity in being placed in the toxic category.

I hope to refer to this matter of the action of auto-poisons on the foetus again in the continuation of this narrative in connection with the histogenesis or embryology of the cytologic elements of the ganglion cells, particularly the chromophilic placques, which I have studied in human embryos, and in the embryos of the tern, pig, acanthias and raia, also in the motor cortex of the cat, dog and human embryos at maturity.

Having in this very general way considered some of the relations of the auto-toxic group of poisons to the produc-

tion of neural diseases, it would next be in order to discuss in the same way the relation of the other groups of poisons, viz.: bacterial toxins, combinations of bacterial toxins and auto-intoxications, and finally, extrinsic poisons in relation to the production of neural diseases. The remaining groups of these toxic substances, however, are best considered in connection with acute degeneration and acute exudative inflammation of the nervous system, under separate headings arranged as follows:

PART II.

ON THE TOXIC BASIS OF NEURAL DISEASES.

SECTION I.—REMARKS ON THE RELATION OF THE AUTO-INTOXICATIONS TO NEURAL DISEASES.

SECTION II.—ON THE CORRELATION OF THE NERVOUS SYSTEM WITH OTHER PARTS OF THE BODY IN THE STUDY OF NEUROPATHOLOGY.

SECTION III.—ON THE SIGNIFICANCE AND INTERPRETATION OF THE GENERAL FUNDAMENTAL PATHOLOGICAL PROCESSES OF DEGENERATION, REGENERATION, NECROSIS AND INFLAMMATION.

SECTION IV.—ACUTE PARENCHYMATOUS DEGENERATION OF THE NERVOUS SYSTEM.

SECTION V.—THE RELATION OF ACUTE PARENCHYMATOUS DEGENERATION OF THE NERVOUS SYSTEM TO REGENERATION OR NECROSIS OF THE NEURONS. DISCUSSION OF THE QUESTION OF RECOVERY AND RESTITUTION IN FUNCTIONS AND STRUCTURE, OR DESTRUCTION OF THE SAME IN THE GANGLION CELL AFTER ACUTE PARENCHYMATOUS DEGENERATION.

SECTION VI.—PRELIMINARY OBSERVATIONS ON A CASE OF ACUTE ALCOHOLISM AS AN EXAMPLE OF ACUTE PARENCHYMATOUS DEGENERATION OF THE NERVOUS SYSTEM.

SECTION VII.—ACUTE EXUDATIVE INFLAMMATION OF THE NERVOUS SYSTEM.

SECTION VIII.—ON THE SECONDARY EFFECTS AND RESULTS OF ACUTE EXUDATIVE INFLAMMATION OF THE NERVOUS SYSTEM.

SECTION IX.—ON THE OCCURRENCE OF ACUTE BACTERIAL POISONING OF THE NERVOUS SYSTEM APPARENTLY INDEPENDENTLY OF GENERAL SOMATIC DISEASE. THE DIFFERENTIAL EQUATION OF TOXIC DISEASES. THE DISTRIBUTION AND SELECTIVE ACTION OF TOXIC SUBSTANCES IN THE NERVOUS SYSTEM.

SECTION X.—ACUTE PARENCHYMATOUS DEGENERATION AND ACUTE EXUDATIVE INFLAMMATION OF THE SPINAL CORD.

SECTION XI.—THE ACTION OF ACUTE OR SUB-ACUTE AUTO-INTOXICATIONS, AND EXTRINSIC POISONS ON THE NERVOUS SYSTEM.

SECTION XII.—THE ACUTE LESIONS OF THE PIA MATER—THE FUNCTIONS OR RELATIONS OF THE PIA MATER TO THE CENTRAL NEURAL AXIS IN THE GENERAL SOMATIC TOXIC DISEASES.

SECTION XIII.—CHRONIC PARENCHYMATOUS DEGENERATION OF THE NERVOUS SYSTEM AND ITS SECONDARY EFFECTS.

SECTION XIV.—ON TABES DORSALIS AND ITS RELATIONS TO CHRONIC PARENCHYMATOUS DEGENERATION OF THE NERVOUS SYSTEM.

SECTION XV.—CYTOTHESIS IN NEURAL THERAPEUTICS.

PART III.

ON HÆMATO-MYELOPORE* AND THE KUTTAROSOME CONUS OF THE RETINA.

SECTION XVI.—ON HÆMATO-MYELOPORE AND ITS RELATIONS TO SYRINGO-MYELIA.

SECTION XVII.—PRELIMINARY OBSERVATIONS ON A NEW MORPHOLOGICAL ELEMENT OF THE CONES OF THE RETINA, THE KUTTAROSOME CONUS.

* This is a name which I have given to a hitherto unrecognized or improperly understood disease of the spinal cord, which is due to the formation of long tubular canals following hemorrhages in the spinal cord.

PLATE I.

ILLUSTRATIONS OF ACUTE PARENCHYMATOUS DEGENERATION OF THE NERVOUS SYSTEM.

Figure 1. Acute degeneration of Purkinje's cells, from the cerebellum of a woman twenty-seven years old, who died of acute alcoholic poisoning a few hours after a violent attack of delirium tremens. The Purkinje cells have been counterstained with eosine after being stained with a *lithium carbonate* methylene blue solution, (Van Gieson). The tissues were fixed in a corrosive sublimate solution and subsequently treated with iodine. (Paraffine sections Reichert 1-18 Zeiss compensation ocular No. 12). There are changes in both the cytoplasm and nucleus of the cells. The cytoplasm has lost nearly all of its chromophilic plaques; it has a faint, pallid, shadowy outline, and is very difficult to see unless counterstaining is employed after the above modified Nissl solution. The left hand cell in the drawing shows a more extensive phase of degeneration than the cell at the right. In the former, the chromophilic plaques have not only been dismembered into dust-like granules, but even these have disappeared with the exception of a few partly segregated plaques at the neur-axal pole of the cell. The right hand cell contains a few shrunken plaques in the same position, and the rest of the cytoplasm is strewn over with the dust-like disintegrated granules of the chromophilic plaques.

In the nucleus the karyotheca is distorted, shrunken and crenated; the karyolymph is more abundant and is radically changed in its chemical constitution. The karyolymph stains deeply with the methylene blue and appears to be converted into a thick fluid which contains the dust-like segregated particles of the chromophilic plaques in solution or suspension. Thus the nucleus instead of being clear, as in the normal cell stained by Nissl's method, takes a deep diffuse stain and is in prominent contrast to the pale or almost colorless cell body.

Figure 2. Acute parenchymatous degeneration in the spinal cord photographed from the anterior horn of the fifth lumbar segment. The fixing and staining methods are the same as employed in the preceding section with the exception that absolute alcohol is used to kill the tissues instead of corrosive sublimate. The section was taken from a case of peripheral neuritis in which a defective history made it difficult to determine whether disease had its origin from an infection or from an extrinsic poison (alcohol). There are but two normal cells in the whole field. *d.d.* All of the others show various phases of the dissolution and disappearance of the chromophilic plaques, as in the preceding section, so that the degenerated cells have the same faint, shadowy contrast to the normal cells. *c.f.* In one or two of the cells the degeneration has gone on

to an actual loss of substance, and in others there is more or less complete destruction of the cells. *c.c.* While it is possible for the majority of these acutely degenerated cells *e.f.* under a cessation of the poison and other favorable conditions to regain the normal structure and function, the cells with extensive vacuolation and destruction are damaged forever and are the cause of the persistent dropped foot and hand in multiple neuritis. (See text).

While Figures 1 and 2 are taken from cases of alcoholic poisoning, the cellular changes are not at all to be considered characteristic, specific or peculiar to this form of poisoning. The changes in these figures are the same as produced in the nervous system by (1) acute autotoxic poisons; (2) acute bacterial toxæmias; (3) combinations of (1) and (2); and (4) acute poisoning by extrinsic substances. These changes are the *expression of a chemical reaction between the poison and the substances which compose the ganglion cell*. With the exception of very early and late stages of the degenerative changes in the ganglion cells, the changes in Figures 1 and 2 are quite the same as are to be found in the cortex, cerebellum or other segments of the nervous system when poisoned acutely or subacutely by *phosphorus, arsenic, carbon monoxide, &c., &c., rabies, typhoid fever and its related diseases, insolation, eclampsia, malaria (?) , pneumonia, influenza, exanthemata, puerperal fever, scarlet fever, measles, diphtheria, acute rheumatism, pyæmia, septicæmia, &c., &c.*

There are no specific anatomical sets of changes in the ganglion cells to correspond to the action of all of these different poisons, or even to correspond to the four great groups of poisons mentioned above. The effects of all of these poisons on the ganglion cell are manifestations of the same thing—a great fundamental pathological process—*acute degeneration with the alternative of regeneration or destruction of the structure and function of the nerve cell*. (See text, Sections III and IV.)

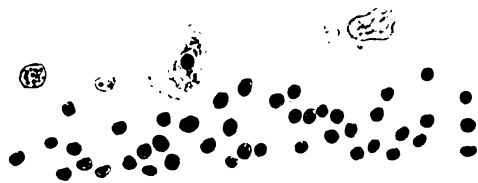


FIG. 1.



FIG. 2.

VAN GIESON, DEL.

PLATE I.

EPILEPSY AND ITS TREATMENT.

BY PERCY BRYANT, M. D.,

Medical Superintendent, Manhattan State Hospital.

The tardy advance made in the therapeutics of epilepsy during the past two or three generations is attributed, and properly so, to our inadequate knowledge of its pathology; but, notwithstanding this confession of ignorance, we still entertain the belief that eventually abnormal changes will be discovered in the brain, to account for the phenomena of the disease. Painsstaking research and elaborate experiments are daily conducted without substantial result, and very likely little advance will be made, so long as the effort is continued in the narrow field of the present day.

I express this opinion, moved as I am with the belief that epilepsy is not a disease of the brain. It has been the aim and the desire of pathologists to discover somewhere in the nervous system of the epileptic some abnormal condition, and thus account for the violence of the symptoms so characteristic of the disease. Quite naturally we have rested upon this theory until we are convinced, even in the absence of reliable data, that the disease is situated in the brain, but it does not follow that this must be so merely because the symptoms are of a cerebral origin, or of a character denoting cerebral irritation. In support of this statement I would observe that the symptoms of epilepsy may depend upon, and be excited by, a toxic condition of the system, in a manner similar to the development of the convulsive seizures in so-called uræmia. In the latter case it is known that the convulsion depends upon a form of toxæmia, and not upon any pathological change in the brain or spinal cord. The convulsions of children, which frequently announce the onset of an acute infectious disease, are an example of the effect of a toxic substance upon a susceptible though healthy nervous system. The same observation may apply with equal force to the convulsions of infants occurring during teething. This

theory of the toxic origin of epilepsy is not new, for Robert Bentley Todd of England advocated the view in the year 1854. His hypothesis, however, based upon speculations of an extremely intricate and imaginative type, was vigorously attacked by Brown-Séquard and other contemporaries.

In the light of our present knowledge, or rather the lack of it, I am justified in holding, with some degree of confidence, to the toxic theory of the origin of epilepsy. Certainly it is more tangible and quite as tenable as the prevailing one, that the brain is the seat of the disease.

To facilitate a proper treatment of the subject on lines mentioned in the foregoing remarks, I deem it advisable, in this paper, to divide epilepsy into two general classes, viz., cases that suffer from periodical attacks of mental disturbance, and those which are free from such attacks.

In the first mentioned class the disturbed period usually appears as a maniacal attack; rarely it assumes the form of melancholia, but in both forms a profound degree of mental confusion, associated with delusions and hallucinations, marks the disturbance. It is regarded as important to recognize the peculiar character of the mental changes that develop in these cases, and frequently it proves to be so from a medico-legal standpoint, for these patients are apt to exhibit a series of psychical phenomena, characterizing the so-called automatic state, and certainly it becomes the observer to recognize these symptoms and realize their significance. However, it has been the habit of both the alienist and the practitioner to stop here in his observation of symptoms, and marvel at the mystery manifested in the strange condition called "double consciousness." The maniacal attack when it develops is also regarded as dependent upon, and in fact a manifestation of, the epileptic outburst under another form. In my opinion both are independent of the epileptic condition though unquestionably modified by it.

Heretofore our observations have been conducted in rather narrow lines with the result that we have failed to

recognize the symptoms in these cases, usually prominent, indicating disturbance of the digestive functions, and upon which the disturbed mental condition solely depends. These attacks may be preceded by retarded stomach digestion or abnormal intestinal digestion, though usually the latter condition prevails, and may be recognized by the ordinary symptoms denoting disturbance of the digestive functions. The attack is usually ushered in by the patient exhibiting for some time previously an abnormal, even ravenous, appetite. There is the coated, frequently furrowed, tongue, the characteristic offensive epileptic breath, and a history of constipation. Convulsions may or may not precede or follow the appearance of these symptoms, but disturbance of the mental function is inevitable and the attack continues until the exciting cause is removed, viz., *acute intestinal toxæmia*.

It is pertinent to the subject to remark that the intestines play a vastly more important part in the digestion of food than does the stomach; and likewise disturbance of intestinal digestion results in proportionately graver consequences. A moment's reflection will recall the fact that during normal digestion, food remains in the stomach for an hour or two only, while it requires two or three days or longer to pass through the intestinal canal. In disturbed stomach digestion food is quickly thrown off, affording, therefore, little opportunity for putrefactive changes to develop here. On the contrary, in the intestines many conditions are present which tend to favor the development of putrefactive changes.

The question arises, What conditions tend to produce this derangement of the intestinal function? As it would be inappropriate to enter here into a discussion of the subject, I would merely allude to one of these chief factors, viz., chronic catarrhal inflammation of the intestinal mucous membrane.

The intestinal canal presenting this condition is easily subjected to a task beyond its capacity, when food, even in moderate quantities, is administered, for there result

accumulation and retarded digestion, followed by fermentation and putrefaction of the intestinal contents, and absorption of the toxines thus formed. As Bouchard aptly expresses it, "Man is but a receptacle and a laboratory of poisons. The human body is the theatre of the toxic elaborations carried on by the normal microbes, which constantly inhabit the alimentary canal." (The experiments of Nuttall and Thierfelder render it probable that the so-called *normal* microbes are entirely unnecessary for the continuance of life, etc.)

Such is the hypothesis I advance to account for the various disturbed mental states that are prone to complicate epilepsy, and when treating of its therapeutics we shall see upon what foundation it is based.

In speaking of epilepsy, uncomplicated by psychical phenomena, I wish to exclude *all the traumatic and reflex disorders* and refer only to idiopathic epilepsy, a point upon which I have but few remarks to make.

Idiopathic epilepsy is characterized by the appearance of convulsive seizures, more or less severe, and occurring at irregular periods. In the interval between the seizures the individual is in a comfortable and normal state, and, excluding a certain degree of dementia, there appears not the slightest manifestation indicating disease of the brain, nor does the most careful examination, post mortem, discover any trace of abnormality.

It is at least as reasonable, in the absence of adequate knowledge on the subject, to attribute the convulsive seizures to the action of toxic substances accumulating in the system, and at intervals exerting an irritating effect upon the brain, as it is to entertain the theory,—for it is nonsense to pronounce it other than a theory,—that the brain is diseased.

I would offer the suggestion that in idiopathic epilepsy some normal product of digestion, peptone for example, possibly gains access to the circulation through an unnatural channel, which, not being properly elaborated, acts as a toxic substance; or possibly the same result may come

from the gradual accumulation of an albumin, globulin or toxic serum, allowed by some error in the elaboration of digestive products. Thus we may account for the presence of a substance in the system exhibiting toxic properties, which, however, does not develop as the result of putrefactive or fermentative changes in the intestinal canal. Evidently in certain cases of simple idiopathic epilepsy we must concede that the disease does not develop from, nor is it dependent upon, the formation of toxic substances resulting from indigestion; for these patients appear to possess healthy and functionally normal digestive organs. Undoubtedly the tendency to the epileptic condition rests primarily upon some peculiar instability or susceptibility of the nervous system, which possibly, in some instances, may be acquired, but probably in the majority of cases is inherited. Consequently the individual thus afflicted can offer but little resistance to the influence of toxins.

Holding this view, tentative and speculative, I confess, concerning the nature of the toxic principle of idiopathic epilepsy, it would seem that a thorough and systematic examination of the urine of epileptics for alkaloids or toxalbumins might prove to be a profitable field for research. Unfortunately we have not at hand in the Buffalo State Hospital the facilities to carry on work of the nature and scope required in investigations of this character.

In treating further on the etiology and pathology of epilepsy, I desire to make some remarks relating to the influence of heredity. The investigations of most authorities on the subject result in the verdict that heredity exerts a marked influence in predisposing the individual to the disease, and the trend of opinion, not only among alienists, but with the general practitioner, is to the effect that the epileptic inherits his misfortune from an ancestor, near or remote.

I am not prepared to accept this view of heredity until I am persuaded by more convincing and reliable proofs than are commonly presented, and which usually appear in the form of statistics. My own experience with statis-

tics does indeed make me sceptical of their value, especially so if they relate to inmates of charity institutions. The information, coming as it does from an uneducated class of people, is apt to be inadequate or unreliable, or both. Furthermore, some of the compilers of statistics on heredity are unfair and unscientific and go to the absurd extent of including in their reports diseases that are entirely foreign to epilepsy, and can not reasonably be considered as exerting a direct hereditary influence. Permit me to present a few examples: *phthisis*, *carcinoma*, *apoplexy*, *hysteria*, *cataplexy*, *hemicrania*, and *insanity*.

It would be absurd to pass argument on some of these, but in regard to the last mentioned I think it pertinent to make a few remarks.

When insanity occurs in a family it is regarded by many of the profession as a factor of consequence in its bearing on heredity and is frequently, if not always, incorporated in statistical tables touching upon the heredity of epilepsy. Why insanity in its bearing on epilepsy should occupy this place, I fail to comprehend, unless it be that the compiler suits his fancy or follows custom, or perchance is influenced by the verdict of other authorities. The term is very indefinite, when used in this particular, and for this purpose, because it embraces a variety of conditions, some of which are known to exercise no influence on heredity.

Reports of the various authorities upon the heredity of epilepsy give widely different results, as the following table shows:

	No. Cases.	Heredity.	Per cent.
Delasiauve.....	300	33	11
Hammond.....	171	21	12
Herpin.....	68	10	14
Sieveking.....	56	11	18
Echeverria.....	306	80	26
Reynolds.....	38	12	31
Gowers.....	1450	507	35
Hamilton.....	980	490	50

The disparity of percentages in the above reports would

seem to bear me out in my statement relative to the lack of accuracy and reliability of statistics.

Speaking briefly on the subject of inebriety and its bearing on epilepsy, I wish to remark that it does not always account for the appearance of epilepsy in the offspring. Inebriety is a disease that develops slowly and usually as a consequence of uncongenial environment. A healthy man, with a good family history, may contract the liquor habit as a result of misfortune, worry, disappointment, hard work and other influences of a like character. It is admitted, and justly so, that inebriety does not necessarily stand as an indication of an hereditary taint in the family. If the offspring of an inebriate is born before the disease in the parent is established, it is probable that his children do not inherit tendencies as a consequence of being born of inebriate parents.

I submit here an analysis of 235 cases of epilepsy, the number admitted to the Buffalo State Hospital in a period of fifteen years. All statements in the records of a vague or unsatisfactory character, relating to the family history, have been included under the title "Not Mentioned." A family history of epilepsy only has been considered in the preparation of this report, as bearing on the question of heredity.

SHOWING HEREDITY IN 235 CASES OF EPILEPSY.

	Men.	Women.	Total.
Father.....	1	—	1
Mother.....	3	—	3
Sister.....	—	2	2
Brother.....	—	2	2
Aunt.....	—	1	1
Uncle.....	—	1	1
Grandmother.....	—	1	1
Great uncle.....	4	—	4
First cousin.....	1	—	1
Good family history.....	75	36	111
Not mentioned.....	63	45	108
Total.....	147	88	235

I desire to call attention to the large number of cases in this report presenting a good family history, viz., 47 per cent, which is in marked contrast to the number presenting a family history of epilepsy, viz., 7 per cent.

AGE AT FIRST ATTACK IN 235 CASES OF EPILEPSY.

	Men.	Women.	Total.
Infancy.....	28	17	45
Five to ten years.....	17	8	25
Ten to fifteen years.....	12	12	24
Fifteen to twenty years....	16	9	25
Twenty to thirty years.....	22	6	28
Thirty to forty years.....	9	5	14
Forty to fifty years.....	7	5	12
Fifty to sixty years.....	1	—	1
Sixty to seventy years.....	2	3	5
Seventy to eighty years.....	1	—	1
Not mentioned.....	31	23	54
Total	147	88	235

Many times the alleged cause of epilepsy is supported only by circumstantial evidence. An injury or illness, or other supposed factor, may be coincident with the appearance of the first convulsion, and therefore lend force to the statements of the patient or relative to the effect that they are accurately informed on the subject of cause. I freely confess to reposing little confidence in the value of the following table of alleged causes, but the report represents accurately, so far as figures are concerned, the result of an examination of our records:

ALLEGED CAUSES IN 235 CASES OF EPILEPSY.

	Men.	Women.	Total.
Idiopathic.....	29	19	48
Injury to head.....	25	5	30
Fright.....	5	4	9
Digestive disorders.....	6	1	7
Scarlet fever.....	6	—	6
Alcohol habit.....	3	2	5
Bodily injury.....	5	—	5
Worry and disappointment.....	3	1	4
Ant. polio-myelitis.....	2	1	3

ALLEGED CAUSES IN 235 CASES OF EPILEPSY.—(Continued).

	Men.	Women.	Total.
Sup. menstruation.....	—	3	3
Puerperal.....	—	1	1
Anger.....	—	1	1
Syphilis.....	—	1	1
Pertussis.....	1	—	1
Typhoid fever.....	1	—	1
Shell wound of leg.....	1	—	1
Measles.....	1	—	1
Vicious habits.....	—	1	1
Climacteric.....	—	1	1
Epidemic influenza.....	—	1	1
Ill treatment.....	—	1	1
Not mentioned.....	59	45	104
Total.....	147	88	235

In 1857, Sieveking, in a paper read before the "Medical and Chirurgical Society" of London, advocated the bromide of potassium in epilepsy, and since then his treatment has been faithfully followed and imitated with a submissiveness truly marvelous. The practitioner of to-day makes the diagnosis of epilepsy, prescribes bromides, complacently contemplates his work and then rests in the assurance that he has done his duty, *secundum artem*.

The treatment of epilepsy conducted on the conventional lines now universally accepted by the profession has been abandoned in the Buffalo State Hospital, and with results so highly satisfactory that we now regard the bromide treatment as unnecessarily severe. Personally I observe the exhibition of the drug with feelings akin to distress, and believe it is not only lacking in therapeutic virtue, but consider it in some respects decidedly harmful. It is prone to irritate the stomach, thereby developing disturbance of the digestive and nutritive functions, the very complication that the physician should avoid in the treatment of epilepsy; for upon a good digestion hinge the patient's chances of passing into a comfortable condition. Further, the decidedly harmful effects exerted by the bromides as presented in the condition "bromism" are so familiar to all that further comment on this subject is unnecessary.

The remarks above, referring to the important influence that the digestive functions exert over the epileptic, apply with a special force to those cases prone to attacks of psychical disturbance; for as I have explained this complication in epilepsy, whether it be an acute maniacal attack, the confusional state called "doubled consciousness," or the condition *status epilepticus*, all depends upon an auto-toxæmia, the result of retarded or disturbed digestion, especially intestinal, a complication that may be controlled by proper diet.

Epileptics suffering from the psychical manifestations of the disease respond readily to treatment based upon the theory of the toxic origin of the attack. It is observed, however, after removing the exciting cause by inducing thorough catharsis and withdrawing nourishment, that the symptoms of disturbance continue, *unless all nourishment be withdrawn for a sufficient length of time to give needed rest to the digestive organs.* The termination of this period is announced when the patient begins to experience sensations of natural hunger. Improvement then usually appears and all symptoms of the attack pass away within several days or a week.

It is necessary to follow careful instructions in regard to the proscription of nourishment. The importunities of the patient should not be yielded to, for the sensations of abnormal hunger of which he complains, during the first day or two after the withdrawal of nourishment, are the result of a deranged condition of the alimentary tract, and are, as I have previously stated, a symptom commonly associated with the acute maniacal state. As a rule, after nourishment has been withdrawn for from one to two days, all symptoms of abnormal hunger disappear, the patient becomes quiet, and expresses little or no desire for food.

Ordinarily after an interval of three or four days, the patient may receive a small allowance of milk, but in cases of violent maniacal disturbance, or in the condition *status epilepticus*, I have found it necessary to withdraw nourishment for a period of eight or ten days, allowing absolutely

nothing in the interval but water. To the casual observer this may seem like resorting to extreme and severe, even dangerous, measures. However, a large clinical experience with this class of cases convinces me that the treatment above outlined is the only effective and rational one.

The milk diet treatment for epilepsy was adopted in the Buffalo State Hospital four or five years ago, and has been continued since with eminently successful results. The majority of epileptics submitting to the treatment improve in a marked way, both mentally and physically, and the seizures diminish in frequency and severity. In many, though not in all, instances, patients who, previous to commitment, suffered from several seizures per week have, after the milk diet treatment, enjoyed immunity from attacks for periods varying from one to eight months, and in isolated cases the attacks have apparently disappeared altogether.

As above stated, the patient becomes, after submitting to this treatment, if dementia is not advanced, brighter, more active and very appreciative; for invariably he realizes that relief has come to him. Indeed it is frequently observed by our nurses that epileptics who have once experienced relief from an enforced limited and special diet voluntarily, during an impending maniacal attack, submit to fasting.

In adopting this method it is necessary to follow specific directions, for an indifferent observance of the rules upon which this treatment of epilepsy is based will avail nothing. The diet should be milk exclusively, and should be continued for several weeks, if not months. The quantity of nourishment to be administered must be limited during the first week or ten days to a meagre allowance—one to six glasses between morning and evening, and none during the night. It is well to follow the rule, that the amount of nourishment allowed must be governed by the condition of the digestive organs and not by the physical condition of the patient; and, in the event that symptoms

of toxæmia appear, to correct this, or rather allow the condition to correct itself, by maintaining the patient for several days on what I would term "water diet," which practically means no nourishment at all.

It is worthy of remark that, notwithstanding the limited diet upon which these patients are maintained, they occasionally gain flesh, in some instances going above the average weight, but more frequently the physical improvement is retarded until they are permitted to return to a regular diet.

The increase in weight occasionally observed in these isolated cases, notwithstanding they are maintained upon a limited diet, would seem to contradict ordinary experience and the laws of physiology, but the explanation is simple. These patients, when treatment is commenced, are found to be in very poor physical condition; they have suffered long from the combined effects of the absorption of toxins and the non-assimilation of the meagre amount of nourishment their deranged digestive organs were able to receive. The system, upon being relieved of the influence of toxins, inaugurated by a change of diet, is able to perform assimilative processes; and the stomach and intestines, now no longer embarrassed by the presence of fermented and accumulating material, are able to work normally, and give forth normal products of digestion. More frequently the effects of a limited diet give the results one would naturally expect, viz., *loss in flesh, strength and activity and well marked anæmia*; a condition, however, that need give little anxiety, as it is easily under control, the patient immediately responding to an increase in diet, when circumstances or safety appear to demand it.

The importance of maintaining normal digestion during the treatment of epilepsy can not be overestimated, for in reality upon this depend the chances of benefiting the patient. Constipation should be immediately relieved by the exhibition of cathartics, laxatives or enemata.

When it seems desirable to return the patient to a regular diet, and as a rule I would recommend that this should

be done after a period of two to four months of the milk diet treatment, it is important to exercise care, and permit only a gradual return to more substantial food. Preferably at the beginning, allow only well baked articles of a starchy nature, such as toasted crackers or zwieback.

The habit of overfeeding the sick is an error too often committed, and I do not exaggerate when stating that the serious consequences following this practice are many times truly appalling. There is no denying that the anxious relatives, with perfectly good intentions of course, are often responsible for the serious consequences following this display of misdirected kindness. Even the attending physician is influenced by the belief that the body in disease is distressed for want of nourishment, and, to supply the supposed enormous waste produced by fever or disease, orders nourishment even when the patient expresses no desire for it, and not infrequently the victim is urged and forced to take nourishment when instinctively repelling the idea.

I have seen develop in epilepsy, and in acute mania and melancholia, rapid and fatal toxæmia, resulting from the injudicious administration of nourishment, when, in my opinion, recovery would have resulted under treatment based upon a properly regulated diet. I think it pertinent to remark here that the condition "acute toxæmia," referred to in the foregoing, is a frequent and often fatal complication of acute mental disease, and heretofore has appeared to us clothed in the indefinite term, "exhaustion."

I am not insensible of the importance of supplying nourishment to the sick, but I maintain that in attempting to force it, in cases prone to disturbance of the digestive function, especially intestinal, we defeat the very object sought; for the food that is forced in these cases but serves to add fuel to the fire, by supplying the alimentary canal with material that must undergo fermentation and putrefaction. In other words, the attempt to supply nourishment to the body when threatened with the absorption of poisons from the intestinal canal, is based upon a wrong

conception of the operation of the digestive and nutritive processes. The question of nutrition is not only subordinate to that of protecting the body against the invasion of fatal poison attacking from within, but it is doubtful if, in the condition alluded to, assimilation is possible.

Permit me to digress for a moment and allude to the practice of forced feeding, so commonly resorted to in typhoid fever. For the reasons explained in the above, and furthermore persuaded by a limited experience, I venture the assertion that forced feeding in typhoid fever is more often harmful than beneficial. In a few cases subjected to a limited diet, or allowed no nourishment, I have been gratified to observe, after all other procedures had failed, a prompt amelioration of the alarming symptoms and a fall in the temperature that previously had resisted all measures. This observation is so completely in harmony with the views already expressed that I can not refrain from presenting it, notwithstanding the treatment advised seems like, and in fact is, reverting to the time-honored though obsolete practice of "starving a fever."

Touching cursorily on the employment of drugs in the treatment of epilepsy, I would speak again briefly upon the use of bromides. Clinically it is certainly demonstrated that the bromides exert a controlling influence over epileptic seizures, but that influence is merely temporary and continues only during the exhibition of large doses. Eventually, notwithstanding the first and apparently encouraging results of treatment, the disease advances, the seizures increase in frequency and in severity, and dementia becomes more pronounced. Added to this, we find a poor physical condition which has gradually developed from the slow poisoning of the system. In fact there are now two conditions to contend with—epilepsy, which has not been controlled, and bromism, which has developed as a result of treating the former disease.

Undoubtedly some advantage is to be derived from the use of the so-called intestinal antiseptics in those cases

of epilepsy exhibiting a tendency to periodic attacks of disturbance, or in fact in all cases presenting any of the psychical forms of the disease; for, as I have shown, these complications of epilepsy depend upon the absorption of poisons from the intestinal canal. However, even under the most favorable circumstances, drugs of this class can exert but feeble antiseptic powers, when employed for the purpose of controlling fermentative changes in the intestinal contents.

Little can be accomplished, unless other measures are employed in conjunction with them, for we are able to use only small quantities of these drugs. It is certainly reasonable to assume that antiseptics, when used in small quantities, produce but a partial effect when brought into contact with a quantity of confined material that is undergoing the changes of decomposition, for such is the condition encountered in the intestinal canal of subjects suffering from symptoms of toxæmia.

The indications, therefore, for the relief of this, are:

- 1st. To diminish the quantity of material in the intestinal canal;
- 2d. To maintain the amount at the minimum;
- 3d. To control the tendency to fermentative changes by the exhibition of intestinal antiseptics;
- 4th. The amount of material in the intestinal canal may be kept at a minimum by maintaining the patient on a limited diet and by the administration of cathartics and enemata.

Regular and sufficient exercise is of much assistance to other measures employed in the treatment of epilepsy. Much, however, depends upon the environment of the patient, his inclinations, degree of intelligence and ability to carry out certain instructions. In suitable cases where it is possible to do so, and when the recommendation would seem to promise favorable results, regular and sufficient exercise should be advised.

It is far from me to entertain views too sanguine.

Chronic idiopathic epilepsy is incurable, and at best we can only hope to ameliorate the symptoms by the enforcement of appropriate moral and hygienic measures.

Only during the *early* stages of the disease are we to expect substantial results from treatment.

The ancients seem to have thoroughly understood the important influence exerted upon epilepsy by diet and exercise. The following, from Plutarch, referring to the well known case of Cæsar bears in clear and concise language upon the point discussed, and the excellent description of the great Roman's personality also lends interest to the passage:

"But they were astonished at his patience under toil, so far in all appearances above his bodily powers; for he was of slender make, fair, of delicate constitution and subject to violent headaches and epileptic fits. He had the first attack of the falling sickness at Corduba.* He did not, however, make these disorders a pretense for his infirmities, endeavoring to strengthen his constitution by long marches, by simple diet and by seldom coming under covert. Thus he contended with his distemper and fortified himself against these attacks."

From the foregoing the following conclusions may be drawn:

1st. Intestinal toxæmia developing in the epileptic results in exciting the various psychical manifestations of epilepsy.

2d. Simple idiopathic epilepsy possibly has its origin in the accumulation in the system of some proximate principle, which, under extraordinary circumstances, exhibits toxic properties, and thus periodically excites convulsions.

3d. The effect of the milk diet treatment upon epilepsy, if sufficiently long continued, results frequently, in diminishing the number and severity of the convulsions, and tends eventually to improve the physical condition of the patient.

* Cæsar went into South Spain as Quæstor in the year 68 B. C. He was therefore about 32 years old when seized with the attack at Corduba.

4th. The harmful effects resulting from the long continued use of the bromides in epilepsy more than counterbalance the apparent benefits.

5th. The epileptic tendency probably depends largely upon a susceptible though otherwise healthy nervous system, which is unable to offer normal resistance to irritation.

THE AUTO-TOXIC ORIGIN OF EPILEPSY.

By J. NELSON TEETER, M. D.,
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In the January number of the *American Journal of Insanity* for 1895, the writer published an article on "The Relation of Urea to Epilepsy" in which the following conclusions were reached: That there is a distinct relation between the excretion of urea, as found in the urine, and the disease in question; that the excretion concerned was decreased in amount, and, furthermore, it was found to show considerable variation when the time of the convulsion was noted; or, more definitely, the total amount of urea excreted before the convulsion occurred was decreased even below the patient's normal excretion, while that following the paroxysm showed an increase. This research was suggested by the all important theory of auto-intoxication advanced during the past few years, but the results were suggestive rather than positive, and it is not until every product of the animal economy possibly toxic, including those known and those yet undiscovered, has been exhausted in every light of its physiological and pathological possibilities that we can throw aside this theory of intoxication in epilepsy. Professor Austin Flint, in his *Practice of Medicine*, says, "In a large proportion of cases of epilepsy no source of centric or eccentric irritation is apparent. That under these circumstances the epileptic paroxysms are due to the action of an internal, and at present unknown, toxical agent seems to me the most

rational hypothesis." It would be very unwise to assume that only epileptics or patients with kindred diseases in which the etiology has been suggested as of toxic origin are sufferers from auto-intoxication, and here we must account if possible for their particular susceptibility. The writer is disposed to believe the two most potent factors in establishing this disease to be, primarily, heredity; and, secondarily, the development of a habit. The fact that heredity is one of the causes of idiopathic epilepsy is established and recognized by everyone, but it is not the disease itself which is transmitted. We do not see epilepsy at birth, and not for years afterward may it show itself. It is the predisposition which is transmitted, and not then until some exciting cause presents itself to act upon the susceptible nerve cells do we have the manifestation of faulty inhibition, development, nutrition or whatever the condition may be. The child of epileptic parentage may have an attack of intestinal trouble (perhaps putrefactive, therefore toxic) followed by a convulsion. The nervous centers have shown themselves susceptible to the intestinal irritant and it is reasonable to suppose that upon a subsequent and similar irritation another convulsion will occur. This predisposition, which might be called the epileptic habit, becomes confirmed when the inhibiting influence governing the action of nerve cells is lost, this inhibiting influence being paralyzed by the intoxicating agent. Gowers says: "Epilepsy is a disease because the tendency to what we call "discharge" is increased each time the tendency has its effect." Thus the epileptic habit is established.

It may be conceived that the intoxicating agent may act as a direct stimulant or irritant to the nerve center, producing convulsions, or it may paralyze inhibiting influences, thus allowing the motor cell full sway of its inherent properties. This assumption might seem to conflict with the unconsciousness existing, according to Mercier, in every case of the grand or petit mal type, but may this condition not be explained by the greater specialization,

the greater sensitiveness of the nerve cell of intellection—consciousness being a condition easily lost upon slight irritation—resulting from which a temporary paralysis of mind occurs, for example, simple syncope or petit mal attacks? In petit mal is there not a developed tendency to response of the nerve cells of intellection to irritation, while the motor and sensory cells retain their resistance to poisonous influences, and as a result there occurs a convulsion of the mind—the irritation being great enough to produce abolition of function? If the irritation were less we should have, as we often see in our epileptics, and which we call masked epilepsy, a condition of mental derangement resulting from over-activity of the nerve centers.

Victor Horsley divides epilepsy into two classes: first, idiopathic epilepsy, including grand and petit mal; secondly, Jacksonian and hysterical epilepsy. It is the first class of cases that presents the most interest and this observer states as causes, extrinsic and intrinsic agencies. The extrinsic are those acting from without the cell—irritants, poisons, etc.; the intrinsic those acting from within the cell—as changes in the cell protoplasm. The extrinsic causes present the most encouraging field for observation in this terrible disease.

J. S. Bristowe reports cases of epileptiform convulsions apparently produced by extreme slowness of the pulse. In his cases the pulse during the intervals between the attacks was as slow as 20 to 30 beats per minute, and after the attacks reached 70 to 120 beats to the minute. It would seem to me that in these cases the extreme slowness of the heart, with the consequent retarded circulation in the veins and lymphatics, allowed the accumulation of toxic principles in the brain, giving rise to an irritation which resulted in convulsive manifestations. Dr. T. Oliver, in reporting a case of "Epilepsy in a Puerpera with Hyperpyrexia," speaks of the imperfect renal action allowing the retention of animal poisons in the blood, "there being no reason why the disordered blood of pregnancy, with its altered arterial tension and plethora should not

so influence the cerebral centers as to lead to the nervous explosion upon which the fit depends." In this patient no convulsions occurred until pregnancy was established, and the author excluded kidney disease or any reflex difficulty.

It has been shown in extended observations by Herter and Smith that intestinal putrefactive processes are distinctly related to the epileptic paroxysm. They have demonstrated that intestinal putrefaction is indicated by the amount of sulphuric acid in ethereal combination found in the urine. The degree of intestinal putrefaction appeared to influence the seizures in part of the cases cited, being less during the intervals and increasing up to and after the attacks. Haig claims a relation between uric acid and epilepsy, namely, that grand mal is caused by an excess of uric acid in the blood, while there is a decrease in the amount found in the urine before, and an excess at the time of the paroxysm.

It thus appears that the subject of auto-intoxication in epilepsy as a factor in its etiology has occupied the minds of many acute observers and is the path in which we should direct our work until the subject is at least exhausted. The excretory products found in the urine and fæces have received most attention and been thoroughly investigated, except the substances found in the urine by Bouchard and which he designates "extractive matters," one of which upon injection into animals produces convulsions, another lowers the temperature, and, lastly, one contracts the pupil. To quote from Bouchard: "One kilogramme of man eliminating in twenty-four hours a quantity of urine capable of killing 461 grammes of animal, the proportional part of the mineral matter in this toxicity may be indicated as follows: potass. kills 217 grammes; soda, 30 grammes; calcium, 10 grammes; magnesia, 7 grammes. The whole of the mineral matter kills 264 grammes. On the other side, urea kills 63 grammes. There remains to be destroyed 134 grammes."

"We may say that one kilogramme of man eliminates in

24 hours organic matter, capable of being fixed by charcoal, which is able to destroy at least 134 grammes of animal. These substances (coloring, extractives or alkaloids) represent 30 per cent of the total toxicity. It is to these substances, still undetermined, that hereafter the effort of chemistry should be directed."

The writer has formulated the following schedule of work directed toward the solution of the problem of auto-intoxication in epilepsy, which will, as far as possible, be carried out in our laboratory:

- | | | |
|----------------------------|---|------------------|
| I. Urine. | { | Intervals. |
| II. Blood. | | Before paroxysm. |
| III. Cerebro-spinal fluid. | | After paroxysm. |
-
- | | | | | |
|-----|---|--|---|---------------------------------|
| for | { | a. Inorganic principles. | { | Urea, etc. |
| | | b. Toxicity as shown by injecting animals. | | Extractive matters of Bouchard. |
| | | c. Organic principles. | | |

On account of the many changes to which the urine is subjected after expulsion from the body, it occurred to him that an examination of the blood itself would present a more direct and definite evidence of toxic principles existing in the body. This is the work at present being carried out, and this report will be confined to the amount of urea found in the blood serum.

Considerable difficulty was experienced in ascertaining a good method by which the urea could be separated from the blood, but the following description of Haycraft's method from the works of Professor Gamgee appears the most simple. Twenty c. c. of blood is defibrinated and placed upon a parchment paper dialyzer and spread over it so as to form a thin layer. Float in a vessel containing 50 c. c. of absolute alcohol. From time to time add a very little distilled water to keep the mass on the dialyzer moist—continue the process for twelve hours.

Treat the diffusate with an equal bulk of concentrated solution of oxalic acid and evaporate to dryness. To the residue add some petroleum naphtha to remove fatty matters. Dissolve the residue in a little water and add barium

carbonate. Evaporate. Treat the residue with boiling alcohol and filter. Concentrate the filtrate, from which, on cooling, urea will crystallize out. The advantage of this method is that the urea is obtained pure and can be subjected to test. The amount of urea in healthy blood has been variously estimated at from 25 to 35 milligrammes per 100 grammes of blood.

The small superficial veins of the forearm should be selected, as, in case obliteration of the vein occurs subsequent to the operation, collateral circulation is readily established. A bandage should be tied tightly above the elbow, as in the ordinary process of bleeding, and after the arm has been made thoroughly clean with soap and water followed by carbolic acid, alcohol and ether, a small incision is made over the distended vein and parallel to it. When the superficial fascia is exposed, the skin should be drawn to one side so that it is possible to cut along side the vein rather than directly over it. If the vein is not completely bared, the hemorrhage will diffuse beneath the fascia and by pressure cause the flow of blood to cease. A small cut is made in the exposed vein and the fine stream of blood is allowed to flow into a glass graduated in cubic centimetres held by an assistant. I have found it better to take 40 c. c. of blood as the specific gravity can be more readily secured. When the quantity of blood desired is obtained, the bandage should be removed at once and a compress dressing applied to the wound. I have experienced no unpleasant after effects from successive bleedings. This should be attended to by an assistant, as the blood requires immediate attention. After defibrination, which may be done with a glass or wire brush, the specific gravity should be taken. It is then placed upon the dialyzer and the process continued as before mentioned. Care should be taken to have the parchment fit very tightly to the glass so as to prevent the possibility of the alcohol leaking directly into the dialyzer, which event would render the operation worthless, as no osmosis would occur. The urea, being a crystalloid, separates from the mass on

the dialyzer and is taken up by the alcohol which, when treated by the oxalic acid, results in the oxalate of urea. The barium carbonate combines with the oxalate of urea, forming the oxalate of barium, separating carbonic acid and urea. After the final filtration and concentration the liquid is left to cool and urea crystallizes out in rhombic prisms, which may readily be seen under the microscope. For tests of urea, Fownes' Chemistry, page 788, may be consulted.

Four cases of idiopathic epilepsy were selected for observation, and the following constitutes a brief history of each case, with a record of the examination made:

CASE No. I.—Male, age 54, single, farmer. Admitted September 12, 1895, suffering from a maniacal condition following several epileptic attacks. His history shows that he had been suffering from grand mal since twelve years of age, the attacks occurring about once a month, and that now he is a confirmed epileptic. Only one examination of the blood could be obtained as patient refused to allow further bleeding.

CASE No. II.—Male, age 30, single, book-keeper. Admitted December 9, 1892, also suffering from a maniacal condition superimposed upon epilepsy. He had suffered from attacks occurring about once a month of the grand mal form since childhood. Only three examinations were obtained in this case.

CASE No. III.—Male, age 37, single, waiter. Admitted August 17, 1893. He has suffered from grand mal for sixteen years, and occasionally from psychical attacks. Since admission to the hospital his attacks have continued with undiminished severity. Four examinations of the blood were procured in this case.

CASE No. IV.—Male, age 32, single, no occupation. Admitted June 4, 1895, with a diagnosis of epileptic dementia. He has suffered since childhood with attacks of the grand mal form which occurred about twice a week. Since admission the attacks have continued with the usual severity and frequency. Eight examinations were made in this case.

For one month previous to the commencement of the blood examination all treatment was stopped and the patient allowed the routine hospital diet. In cases III and IV all the urine was collected and examined for the total amount of urea excreted by the kidneys in twenty-four hours, and attention paid to the variation in the amount

before and after convulsions. A convalescent patient was used as a "control" case in the blood examinations. In the following table a record of the quantity of blood drawn, its specific gravity, the amount of urea found, and the relation of the examination to an epileptic paroxysm is given:

BLOOD EXAMINATION.

Date.	Case.	Quantity in c.c.	Quantity in grammes.	Specific gravity.	Time of exam- ination.	Urea in grammes found.	Percent. urea per 100 grammes of blood.
June 24	I	40	42.24	1056	.....	.03	.072
July 9	II	40	42.32	1058	.....	.005	.01165
" 13	"	20	21.12	1056	.....	.021	.098
" 16	"	40	42.32	1058	Ten minutes after fit.	.032	.0755
" 2	III	20	21.12	1056	.....	.02	.094
" 7	"	40	42.16	1054	.....	.015	.0345
" 9	"	40	42.16	1054	Three fits from 6.30 to 7.30; blood after 1st	.01	.024
Aug. 17	"	20	21.12	1056	Just after fit. [fit.	.015	.0709
June 24	IV	20	21.12	1056	.....	.032	.150
" 30	"	20	21.12	1056	.....	.02	.094
July 2	"	40	42.24	1056	Fit, II P. M., blood,		
					II. 10 P. M.	.118	.2654
" 7	"	20	21.08	1054	Fit, 9 A. M., blood, 4 P. M.	.01	.046
" 13	"	40	42.24	1056	Just after fit.	.012	.028
" 20	"	40	42.00	1050	Just after fit.	.02	.047
Aug. 16	"	20	21.20	1060	Ten minutes after fit.	.02	.0942
Sept. 12	"	40	42.16	1054	Six hours after fit.	.021	.0497
June 12	Control case	20	21.12	1056	.....	.005	.025
Aug. 24	"	20	20.90	1045	.....	.003	.0143

It will be observed in an analysis of the foregoing table that in case No. I the amount of urea obtained in the single examination exceeded the normal of .025 to .035 grammes per 100 grammes of blood—averaging about double this estimate. There was no convulsion in proximity to the examination. In case No. II the first examination presented a decrease from the normal; the second a considerable increase, being .098 grammes per 100 grammes of blood. There was no convulsion before these examinations. The third examination was made

ten minutes after an attack of grand mal, presenting an increase above the normal to .0755 grammes. This is lower than the result obtained on July 13th, but it may be noted that the fit followed three days later. It will be seen in the examination of July 7th of case IV, that the amount of urea found apparently decreases the longer the interval up to a limited point between the fit and the examination. We find in this case an average for the three examinations of .0617 grammes per 100 grammes of blood, or, in other words, about twice the amount of urea found in normal blood.

Passing on to case No. III: On July 1st patient had a number of severe epileptic attacks of the grand mal form. The examination of the blood on the day following showed .094 percentage of urea. No convulsions occurred before the examination of the 7th, and the percentage of urea fell to .0345 grammes. On the 9th patient had three fits and the blood drawn between the attacks showed in this instance only the normal average, the percentage being .024 grammes. On the 17th the blood taken directly after the fit showed .0709 grammes of urea per 100 grammes of blood. The average amount of urea found in 100 grammes of blood for the four examinations we therefore find to be .055 grammes, which will be seen to exceed the normal.

In case No. IV, the first examination gave a result of less than normal, the second a considerable increase, and the third, which was performed ten minutes after the convulsion occurred, reached the remarkable average of .2654 grammes in percentage amount. These three examinations showed a continued increase up to and just following an epileptic paroxysm. The next examination, made five days later, and seven hours after a convulsion, showed .046 grammes of urea, a marked decrease over the previous result. An examination on the 13th, and after a fit, showed a still further decrease, when the amount again began to rise, and on August 16th reached .0942 grammes in percentage amount following a fit. In this case it will

readily be seen how greatly the amount of urea varies and how inconstant are the results as compared with the epileptic paroxysm. In the control case it will be noted that the urea held to or was below the normal average.

The average amount of urea passed by the urine in case No. III during the months of July and August was 9.45 grammes per 24 hours; less than one-third the normal amount. An increase in the amount of urea per cubic centimetre before the convulsions occurred was noted and corroborated the results recorded in the writer's previous paper spoken of in the first part of this article. In case IV the average amount of urea excreted by the kidneys was 11.64 grammes per 24 hours—about one-third the normal amount of 33.19 grammes. A similar increase in amount of urea per cubic centimetre before the fit occurred was noted in this case.

Conclusions: As before quoted, Bouchard states that of the 461 grammes of animal killed by the amount of urine excreted by one kilogramme of man in 24 hours, urea killed only 63 grammes, from which we must infer that urea represents only a small part of the total toxicity of the urine. My results, though meagre, would seem to corroborate this view, for the variability of the amounts of urea found, even when examinations were made under apparently similar physical conditions, would seem to prevent the possibility of placing much importance upon this excretory product as a cause of epileptic convulsions. I do not mean to eliminate it entirely from the list of toxic causes, for it is probable that auto-intoxication is not due to any one toxic principle alone, but to the action of a combination of all the poisons.

We can only conclude that, firstly, there is an average increase in the amount of urea found in the blood serum of cases of idiopathic epilepsy above that of normal man; secondly, there seems to be but little relation between the amount of urea found and the epileptic paroxysm, as in some cases we find an increase directly after a fit, in others a diminution. The increase of urea found in the

urine after a convulsion must be accounted for in other ways, possibly by the great muscular exertion during the fit, or by the diuretic action of the urea itself as it accumulates in the blood. This would seem to be proven by the blood examination, as the amount of urea found was seen to gradually decrease for some time after the epileptic paroxysm occurred. Probably a more fruitful field of research in this direction will be an examination of the toxicity of the blood serum before, after, and during the intervals of epileptic convulsions, as shown by injection into the lower animals.

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AN EPILEPTIC WHO HAS BECOME INSANE.

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Section 60 of the Insanity Law of New York State provides that an epileptic person becoming insane may be committed as an insane person to a State hospital for custody and treatment therein.

It is, therefore, the duty of every medical examiner in lunacy and of every medical officer of a State hospital to clearly differentiate the symptoms of epilepsy and insanity, to the end that symptoms belonging to epilepsy proper are not inadvertently considered as evidence of insanity.

The legal definition of insanity and not the medical must be the guide in all matters referring to the admission of a person to a State hospital.

The petition and medical certificate prepared by the relatives and medical examiners in lunacy, for an epileptic person, should be written with special care and all symptoms belonging to epilepsy carefully excluded.

It is most difficult to prove that an epileptic is insane to such a degree as to be a legal and proper case for a State hospital.

An epileptic is one afflicted with a chronic disease which manifests itself by periodical seizures attended with loss of consciousness. The seizures are usually convulsions which may be accompanied by mental disturbances. The great majority of epileptics experience a gradual mental change, in that the memory becomes more feeble, the temper more irritable, selfishness more predominant and incompetency more complete. Only the small percentage of epileptics who become insane are entitled to care in New York State hospitals.

In nearly all epileptics there are more or less changes in the mental states; sensations are blunted, perceptions are perverted, memory weakened, ideation dulled, and reasoning and judgment impaired; the person becomes more emotional and the will is weakened.

To formulate a definition of epileptic insanity that will be specific and comprehensive is as difficult as it is to formulate one of insanity in general; each individual case has to be studied and evidences of insanity found which do not belong to epilepsy and which render the patient dangerous to himself or others.

Epileptic insanity may take the form of melancholia or of mania. If there develop hallucinations and delusions of a fixed and painful type we have epileptic melancholia, if of an exalted and changing type, epileptic mania; but the mental disturbance which accompanies the epileptic seizure and is a part of it, should be carefully excluded from the evidences of insanity. In this connection it should always be remembered that, in some cases, true epileptic seizures often follow each other closely for several days; also that epileptics are not entitled to a certificate of insanity based upon symptoms manifested while they are under the influence of liquor.

After an insane epileptic has been admitted to a State hospital, it is very important that his case-book record should be written up fully and completely at frequent intervals, with special reference to the symptoms of insanity. This case-book record should be so clear and complete that the State Commission in Lunacy or the superintendent of the hospital can at any time intelligently determine therefrom whether the person should continue in custody as insane or be discharged as an epileptic, not insane.

The provisions of the State constitution and of the statute are so explicit and emphatic that it is clearly intended that epileptics not insane shall be excluded from the State hospitals, and cared for by the superintendents of the poor in the several counties.

A critical examination of the records of the epileptics now in custody in the State hospitals will probably show that evidences of insanity entirely independent of epilepsy are very meagre. When such symptoms are entirely lacking it is the duty of the superintendents to discharge such patients.

Section 74 of the Insanity Law says: "A poor and indigent patient discharged by the superintendent, because he is an idiot, or an epileptic not insane, or because he is not a proper case for treatment within the meaning of this chapter, shall be received and cared for by the superintendent of the poor or other authority having similar powers, in the county from which he was committed."

The undoubted purpose of this section was to place upon the superintendent of each hospital the duty of refusing to receive epileptics who had not become insane, and also the duty of discharging such cases as had formerly been received under the old law.

In order that these unfortunate people should be provided with support and care when refused admission or discharged from a hospital, the superintendents of the poor are required to receive them and support them, if dependent.

The statute also implies that it is permissible for an epileptic to be retained for a sufficient time for the hospital authorities to ascertain by personal observation whether the abnormal mental condition exhibited by the epileptic is that of irritability, weakened memory, dulled ideation, impaired judgment, predominant selfishness and feeble-mindedness which belong to epilepsy; the delirium arising from an epileptic's indulging in liquor; or is a true manifestation of insanity.

THE OPHTHALMOSCOPE IN EPILEPSY WITH ANALYSES OF FUNDUS OCULI.

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The ophthalmoscope has at this time attained to a permanent and undisputed place as a means of diagnosis in cerebral affections.

Upon looking back over the literature to its first employment in these diseases we find Bouchet followed by Hugh-

lings Jackson, Albutt, and Aldridge of London, together with numerous contemporaries in this country. The first to employ the ophthalmoscope to any extent in cerebral diseases was Albutt of Leeds, in general paralysis of the insane, followed by Aldridge in epilepsy, both of whom record their observations in the West Riding Asylum Reports of 1871, Vols. I and II. More recently Dr. M. Allen Starr of New York has written a series of interesting articles on the condition of the eye in epilepsy.

Through the efforts of these men several points of vital interest have been worked out, but it is well nigh impossible to gather them in any satisfactory manner owing to their being widely distributed in various medical journals.

In writing this paper I desire to record my observations with the ophthalmoscope, of the eyes of fifty epileptics now in this hospital. With a single exception all of my observations were made during the inter-paroxysmal period. I have endeavored to see the fundus during the paroxysm and have remained upon the wards in order that I might accomplish it, but so far I have been able to obtain only one view during the state of stupor following a severe fit. Several observers have seen the fundus during the entire fit—Dr. Hughlings Jackson described it thus: "The optic discs were extremely pale, once the vessels disappeared for an appreciable time. After a while, however, they reappeared and were found to vary with the respiration. When the patient inspired, the vessels disappeared, returning again on expiration, like lines of red ink upon white paper." In this one case, which I observed, the veins were very much dilated and filled with very dark blood, but there was no noticeable change in the arteries. In order to find the relation these phenomena bear to the fit itself we must analyze the latter. Dr. Russell Reynolds, quoted by Aldridge, gives the cause of the convulsion as follows: "By contraction of the vessels the brain is deprived of blood, and consciousness is arrested; the face is, or may be, deprived of blood and there is pallor. By contraction of the muscles, which have been mentioned, there is

arrest of respiration; the chest walls are fixed and the other phenomena of the first stage are brought about. The arrest of breathing leads to the special convulsions of asphyxia, and the severity of these is in direct proportion to the perfection and continuance of the asphyxia. The subsequent phenomenon is poisoned blood, i. e., of blood poisoned by the retention of carbonic acid, and altered by the absence of a due amount of oxygen."

It is now not a difficult task to account for the dilated and congested veins which I have mentioned above. I pass on from the paroxysmal to consider the inter-paroxysmal period and see what effect constant repetition of fits has upon the fundus. In order to do this I examined fifty-six epileptics now in this hospital and the ophthalmoscopic appearance of each will be found at the end of my paper.

It will be noticed that in a great number of the cases hyperæmia of the disc was present. Soelberg Wells tells us "there are two kinds of hyperæmia—active and passive; active when the arteries as well as the veins are affected, and passive when the veins only are involved. The former may be produced by division of the sympathetic in the neck, also straining the eyes as in doing fine work, and it may also occur as the forerunner of inflammation in other parts." Passive hyperæmia is also described by him as follows: "We notice that the retinal veins are abnormally large, dark and, perhaps, tortuous, and this is especially marked in the smaller veinlets, and these latter may present a corkscrew appearance. This form of hyperæmia is usually slow in its development and is due to a state of venous congestion dependent perhaps upon some disturbance in the general circulation or upon local causes which impede the efflux of blood from the retinal veins."

By looking over the causes which we have present in epilepsy we find that in the greater number of cases we have to deal with passive hyperæmia. It will be seen in my table at the end of the paper that the veins are recorded as "large," "dilated," "tortuous," "filled with dark blood" and "filled with not very dark blood." There

are cases in which the veins are tortuous. Rokitansky says phlebectasis may attack the whole venous system uniformly, or it may be limited to almost any section, and that it is either originally developed on the small venous radicles and extends from them to the great trunks, or it may commence in the latter and retrograde to the ramifications. The same author says, "phlebectasis may be caused by: mechanical impediments to the circulation; pressure upon a large venous trunk; excessive activity of an organ, accompanied by its enlargement and hypertrophy; also repeated hyperæmia of an organ." We find several of these in the body of the epileptic. Pathological anatomy shows us that there are chronic congestions present, and these are evidenced by coarseness of the hair and thickness of the bones of the skull. Schröder Vander Kolk in his work called attention to the dilated capillaries of the medulla oblongata. He said it existed "not as the cause, but as the result of the disease." All modern investigators are in accord with him. He further stated that these vessels by encroaching upon the ganglionic nerve cells compressed them and, interfering with their function, produced dullness and loss of memory, or, if after a fit an unusual current of arterial blood is supplied, we have immediately upon the paroxysm a condition of epileptic mania.

It may be well here to mention the appearance of the central excavation. In one patient both excavations were found to be of a deep reddish pink color. This confirms Niemetschek and Aldridge who say they have observed a capillary network covering it.

Thinking it would be interesting to know the percentage in which the various phenomena presented themselves a table was constructed containing the result of each eye examined, and is appended at the end. The optic disc was deeply congested in 27 per cent; slightly congested in 20 per cent. Margins distinct in 84 per cent and hazy wholly or in part in 15 per cent. The central excavation was found normal in 72 per cent; small or nil in 16 per

cent and pink or pinkish red in 11 per cent (*sic*). Disc was surrounded by pigment wholly in 23 per cent and partly in 26 per cent. Arteries: normal in 70 per cent; small and thready in 13 per cent; tortuous in 11 per cent; branch much in 21 per cent; numerous in 23 per cent; reflex faint in 2 per cent. The veins are of normal size in 20 per cent; dilated in 26 per cent; large in 47 per cent; small in 3 per cent; tortuous in 46 per cent; branch much in 63 per cent; filled with dark blood in 63 per cent; filled with not very dark blood in 37 per cent. The choroidal glow is dark in 41 per cent; light in 59 per cent. Prominence normal in 64 per cent and retracted in 36 per cent; irides were blue in 42 per cent; gray in 12 per cent; brown in 46 per cent. Pupils were dilated in 36 per cent; contracted in 4 per cent; equal in 88 per cent; unequal in 12 per cent; responded to light actively in 78 per cent; sluggish in 22 per cent.

The urine was examined as follows:

Average specific gravity 1022.42; minimum, 1003; maximum, 1033.

Reaction acid in 94 per cent; neutral, 4 per cent; alkaline, 2 per cent.

Albumen (traces), 6 per cent.

Sugar absent.

Urea: average 1.962 per cent; minimum, .2 of 1 per cent; maximum, 3.4 per cent.

The conclusion is, therefore, that in the eyes of epileptics during the inter-paroxysmal period there is found a condition of passive hyperæmia with dilatation and tortuosity of the veins in a large percentage. The arterial supply is not materially affected.

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ANALYSIS FUNDUS OCULI EPILEPTICS—(CONTINUED.)

	Pup. Reac.		Spec. Grav.	Reaction.	Albu- men.	Sugar.	Urea.
1	Active		1020	Acid	o	o	2.
2	"		1030	"	o	o	3.4
3	"		1025	"	o	o	3.
4	"		1033	"	o	o	2.4
5	Sluggish		1022	"	o	o	2.2
6	Active		1009	"	o	o	1.6
7	"		1018	"	o	o	.5
8	"		1028	"	Trace	o	2.1
9	"		1027	"	o	o	2.6
10	"		1030	"	o	o	2.1
11	"		1014	"	o	o	.7
12	Sluggish		1007	Fnt. Acid	o	o	.5
13	Active		1023	Acid	o	o	2.3
14	"		1021	"	o	o	1.8
15	Sluggish		1025	"	o	o	1.5
16	Active		1019	"	o	o	1.3
17	"		1024	"	o	o	2.8
18	Sluggish		1010	Fnt. Acid	o	o	.8
19	Active		1020	Acid	o	o	.9
20	"		1025	"	o	o	3.
21	"		1024	"	o	o	2.
22	"		1031	"	o	o	2.8
23	"		1012	Neutral	o	o	.8
24	"		1003	Fnt. Acid	o	o	.2
25	"		1025	Acid	o	o	2.
26	"		1028	"	o	o	2.5
27	"		1031	"	o	o	2.5
28	"		1031	"	o	o	3.
29	"		1015	"	o	o	1.
30	"		1025	Fnt. Alkaline	o	o	1.
31	"		1023	Acid	o	o	2.
32	Sluggish		1024	"	o	o	2.5
33	Active		1022	"	o	o	2.2
34	"		1028	"	o	o	3.1
35	Sluggish		1026	"	o	o	2.4
36	Active		1020	Fnt. Acid	o	o	1.2
37	"		1027	"	o	o	2.6
38	"		1021	Neutral	o	o	1.
39	Sluggish		1021	Acid	o	o	2.2
40	Active		1010	"	o	o	.8
41	Sluggish		1026	"	o	o	2.2
42	"		1031	"	o	o	2.9
43	Active		1025	"	o	o	2.3
44	"		1028	"	o	o	2.4
45	"		1014	"	Trace	o	1.2
46	"		1024	"	o	o	2.8
47	Sluggish		1020	"	o	o	1.8
48	Active		1022	"	o	o	2.1
49	Sluggish		1030	"	o	o	3.
50	Active		1024	"	Trace	o	2.1

SOME OBSERVATIONS ON THE TREATMENT OF EPILEPSY.

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Since it takes anywhere from eighteen months to two years to form any definite conclusion relative to the treatment of any case of epilepsy, this report must necessarily be considered as preliminary to a later one. No case here reported has been under treatment longer than eight months and several cases have been treated only four or five months. The results, while not startling, are nevertheless encouraging, and some of the patients have shown a decided improvement. In some cases the number of convulsions has not only been lessened, but there also has been a gain in flesh and strength. Some have improved mentally as well as physically, though the number of convulsions per month shows little variation.

On April first of this year (1896) I began the treatment of twenty-five cases of epilepsy, all insane. Since the commencement of treatment of these cases others have come under my care until now the number exceeds fifty. A report, however, is made of only forty-two cases, as the remaining number has been under treatment for too short a time to warrant any satisfactory report.

Of the forty-two cases, nineteen are men and twenty-three are women. Of the men, three are imbeciles. Of the women, eight are imbeciles. The tables given show the number of convulsions had in each month and each column gives the number of diurnal and nocturnal attacks. Each drug will be treated of under its own name.

TRIONAL.—On April 1st, 1896, seven women were put on the treatment of trional and in May one additional. Owing to the ill effects of the drug on three patients only five were continued on the treatment for any length of time. Of the five cases the average age is thirty years, the oldest being forty-six and the youngest fourteen. The

average duration of the disease is twenty-two years, the longest duration being forty and the shortest eleven. Heredity is admitted in only one case. Two patients out of the five are imbeciles.

Causes of the disease:

- 1 anterior polio-myelitis, (imbecilic).
- 1 congenital defect, “
- 1 marriage (?).
- 2 unknown.

One patient gained in flesh and in mentalization; two show no essential change in either mental or physical condition, and two died. The effects of the drug have proven to be of so much interest that I give a short account of each case.

CASE No. 7314.—A female, aged 43, widowed and of German birth. On April 1st she was given trional gr. x t. i. d. The dose did not have the desired effect, and on August 3d, the night dose was increased to gr. xx. On October 15th, a midnight dose of gr. xv was given. This amount seemed to control the convulsions to a greater extent, but on November 8th the trional had to be stopped owing to the very stupid and dazed condition of the patient. The flow of saliva was rather diminished and quite thickened, and the tongue was coated a whitish yellow. While under the influence of the drug, this patient had acute hallucinations of sight and of hearing. She thought she was covered with spiders and small “creeping things,” which she was constantly attempting to pick off her person. That condition lasted about twenty-four hours when she became more quiet and controlled. The urine was slightly diminished in quantity and was more highly colored than normal. By reference to Table No. 1 it will be seen that the number of convulsions increased in November. Trional was stopped on November 8th. She is now taking tr. simulo, one drachm t. i. d., and for twenty-five days of December she had only one convulsion.

CASE No. 6407.—A female, aged 15, single, imbecilic. Duration of epilepsy, eleven years. Had a large head and over-hanging superciliary ridges. On April 1st, she was given trional gr. x t. i. d. On April 8th patient was drowsy, stupid and helpless. Trional reduced to gr. v t. i. d. On June 28th and 29th she was in *status epilepticus* for six and five hours respectively. The trional was increased to gr. x at night. July 31st, trional was increased to gr. x t. i. d., and the patient was up and about the ward. On August 7th she was very stupid and in a helpless condition,—pulse feeble and eyes blood-shot.

Tongue was coated and there was thickening of the saliva, and sordes had gathered on the teeth. She soiled and wet the bed, and her urine was very offensive in odor. Trional was stopped. On August 8th she was in *status epilepticus*; she died on the 9th.

This case was on trional about four months and, as seen from the above statements, the drug was very badly borne. The number of convulsions continued to range in the twenties for each month. The dose of the drug at no time exceeded gr. xxx per day. There was a slight change of seizures from diurnal to nocturnal, (see Table No. 1). There was no improvement in the mental condition of this patient at any time while under treatment. She was naturally of feeble constitution.

CASE No. 6361.—A female, aged 34, married. Cause of disease, marriage (?). On April 1st patient was given trional gr. x t. i. d. On April 30th she was drowsy, stupid, and her pulse was feeble. Circulation in the extremities was not good. Trional was reduced to gr. v t. i. d. June 6th. No change in the dose had been made since the last note in April, but on the date mentioned (June 6th) patient was confined to bed and in a helpless condition; tongue was dry and coated and temperature registered 100°F. Body was bathed in cold perspiration, and her pulse became very feeble. Urine was highly colored and offensive in odor. Trional stopped. On June 7th her saliva became thick and tenacious and she had symptoms of nephritis. Patient died on June 9th in *status epilepticus*. Her temperature rose to 103°F. two hours before death.

AUTOPSY.—Body emaciated. *Brain*—Congestion of the brain membranes was very apparent over the convexity; pia congested but not adherent to the brain substance. Brain substance showed considerable softening and punctiform hemorrhages appeared on the cut surface. Blood vessels were a trifle thickened. Brain weighed 43½ ounces. *Heart*—Small and flabby with considerable thinning of the walls. There were signs of an old endocarditis about the tricuspid and mitral valves. Weight, 6½ ounces. *Lungs*—Right lung was bound down by old adhesions posteriorly, and there was oedematous infiltration throughout. The left had old pleuritic adhesions at the apex only, otherwise it was similar to the right. *Liver*—Small, congested, and would tear readily. Weight, 42½ ounces. *Kidneys*—Capsule adherent in each. A small cyst was found in the cortical substance of the left. Weight, 4 ¼ ounces each. In the uterus was a small fibroid tumor. The left *ovary* contained a cyst the size of a hen's egg. Right was normal. *Spleen* was small and would tear easily. Weight, 2¾ ounces.

CASE No. 5227.—This case is a girl, 14 years old. She has developed a tolerance for trional which is very interesting. She has been suffering from epilepsy 13 years. Just after birth she is said to have suffered an attack of right hemiplegia, but no signs of such are now present, and both sides are equally developed. She has good use of her limbs and does ward work. Since the treatment with trional she has become much brighter, and she is learning to read and to write. April 1st patient was given trional gr. x t. i. d. In May she had five convulsive attacks as compared with twenty in April. On June 1st the morning and evening doses were increased to gr. xx each. On June 18th she was dull and apathetic; complained of vertigo. Was put to bed and trional was reduced to gr. x t. i. d. June 24th dullness and apathy had disappeared and trional gr. x added to the night dose. July 2d ten grains of trional added to the morning dose. On August 3d a midnight dose of trional gr. x was given, thus making a daily dose of 60 grains of trional. On August 31st she was dull and listless and did not get about the ward well, and she complained of vertigo. Her tongue was slightly coated and there was an increased flow of saliva. Midday dose of trional left off for two days. On December 1st the following note was made: Patient has had no other untoward effects from the use of trional since the last note, and the dose has been gradually increased to a *daily dose of seventy grains*. She has gained in flesh and assists in the care of other patients.

CASE No. 3963.—A female, aged 46; has suffered from epilepsy thirty-one years. She was put on trional gr. x t. i. d., April 1, 1896. The dose has been gradually increased until now (Dec. 1) she gets gr. xx t. i. d., with no ill effects. She has been taking carnogen t. i. d. She has not gained in flesh nor has she lost in strength. She has fewer convulsive attacks and there has been a complete change from diurnal to nocturnal seizures.

Now it will be seen, from the foregoing statements, that of the five cases, two improved, one showed no essential change for the better and two died. Both of those that died were of feeble constitution and had weak hearts. Both patients died in *status*, and whether the trional hastened the death of either I am unable to say. Certainly the deleterious effects were not sufficient, within themselves, to cause death.

Three other cases were put on the treatment of trional, but, owing to the peculiar action of the drug in those cases, it had to be discontinued and another substituted.

The cases are given below and a study of them will impress us that we must be very careful in the continuous use of trional.

CASE No. 5434.—A female, aged 22, and single. On April 1st, 1896, she was given trional gr. x t. i. d. On May 19th, she was dull, feverish and almost helpless. Sordes had gathered on the teeth and the saliva was thick and tenacious. Pulse feeble, but regular. Urine was passed in less than normal quantity and was highly colored, but not offensive in odor. Trional was stopped. On May 23d patient was stronger and not so confused. Her saliva was nearer normal and sordes were disappearing from the teeth. Bowels were regular and urine normal in color. See Table No. 2.

CASE No. 6521.—A female, aged 23, single. Cause of disease, overstudy. On April 1st, she was given trional gr. x t. i. d. She had one convulsion in May and five in July. On August 3d, the dose of trional was increased to gr. xx at night. On August 31st, the flow of saliva became excessive, thick and tenacious. September 19th, trional was stopped. Patient had become bed-ridden and very feeble. The flow of saliva continued excessive, but grew less thick. Urine appeared normal, appetite remained fair and vegetative functions regular. Patient had been taking carnogen since August 3d. After stopping trional, symptoms of prostration became less severe and strontium bromide was given. Patient died on October 1st, in *status epilepticus*. See Table No. 2.

CASE No. 7370.—A female, aged 22, single, imbecilic. Cause of disease, meningitis. Following meningitis was paralysis of the right side. Patient has considerable use of the affected limbs, though atrophy of the muscle is very prominent. On May 15th, patient was given trional gr. x t. i. d. On August 3d, the dose was increased to gr. xx at night and gr. x at midnight. On August 16th, patient was prostrated and almost helpless. Flow of saliva increased, drooling over herself and bedding. She complained of vertigo and wanted to sleep. Trional was stopped, and strontium bromide was substituted. On August 23d, patient was up and about, and the ill effects of the trional had completely disappeared. (See Table No. 2, for this case).

Of the eight original cases with which treatment by trional was commenced, four had to be taken off the use of the drug. (See cases No. 5424, 6521 and 7370, table No. 2, and case No. 7314, Table No. 1).

Of the five cases tabulated in table No. 1, the convulsions became more severe in character, though less in number, after treatment, in two, and less severe in character in three. Two now work who were formerly idle, and one

is brighter in mentalization. The largest daily dose has been *seventy grains* and the next largest *sixty grains*. (See cases No. 5227 and 3963, table No. 1). The smallest daily dose to cause physiological action has been *thirty grains*, though a daily dose of *fifteen grains* kept up the action in one case, after it had been produced by giving *ten grains three times a day*. (See case No. 6361).

TABLE No. I.—TRIONAL TREATMENT.

Diurnal and nocturnal seizures had in each month.

Case No.	Age.	April.		May.		June.		July.		Aug.		Sept.		Oct.		Nov.		Total
		D	N	D	N	D	N	D	N	D	N	D	N	D	N	D	N	
5227	14	12	8	4	1	12	5	6	8	1	1	0	0	2	0	5	1	66
3963	46	6	3	2	11	3	9	3	13	0	7	0	6	0	1	0	3	67
7314	43	6	0	4	3	0	5	1	6	1	4	2	4	1	2	1	8	48
6407	15	8	12	6	19	3	18	1	5	..	..	..	..	..	..	..	..	96
6361	34	4	2	2	2	6	1	..	..	..	..	..	..	..	..	..	..	17

Case No. 6407 died August 9th in *status epilepticus*.

" " 6361 " June 9th.

Trional stopped in case No. 7314 in November.

STRONTIUM BROMIDE.—Eleven patients have been treated with strontium bromide. Eight were put on gr. x t. i. d. May 1st; one, gr. xx t. i. d., May 15th; one, gr. xx t. i. d. in August, and one in September. The three last mentioned had been taking trional, (Cases Nos. 5434, 6521 and 7370, Table No. 2). The average age of the eleven patients is thirty-four, the oldest being sixty-three and the youngest seventeen. The average duration of the disease is twenty-six years, the longest duration being fifty-six and the shortest six. Heredity has been admitted in one case.

Causes of the disease:

- 1 Meningitis, (imbecilic),
- 2 Infantile paralysis,
- 1 Overstudy,
- 3 Began at the age of puberty,
- 4 Unknown.

The dose of the drug has been gradually increased until the average daily dose taken is *ninety grains*, the largest daily dose being *one hundred and ten grains* and the smallest *seventy grains*. To prevent bromism one-half minim of liq. pot. arsenicalis to every ten grains of the salt of strontium has been given. Very slight bromism has occurred in four patients. Convulsions per month have been reduced in number in nine cases, and two died in *status epilepticus*. Eight gained in flesh and one lost slightly. Menstruation has been regular in five, while three are past the menopause. Four have improved in mentalization and are quicker in action. One, a typical imbecile, who at first was too stupid to attend to her wants properly, is now quite able to do so, and she takes notice of what is going on about her and will try to assist at ward work.

The convulsions are more severe in character, though less in number, in two cases, less severe in four cases, while there has been no appreciable change in character in five. Neither appetite nor digestion has been interfered with, except in one case where there was a tendency to constipation and that was corrected by giving *four minims of ichthyol t. i. d.* For a study of the cases in regard to the number of convulsions had in each month, see table No. 2. Cases No. 4992, 6889 and 7014 changed from diurnal to nocturnal seizures, and case No. 7370 showed a marked tendency in the same direction. Since the treatment commenced, four patients do some kind of work on the ward, whereas formerly they were constantly idle.

TABLE II.—STRONTIUM BROMIDE TREATMENT.

ALL WOMEN.

This table gives the number of diurnal and nocturnal seizures had in each month.

Case No.	Age.	April.		May.		June.		July.		Aug.		Sept.		Oct.		Nov.		Total
		D	N	D	N	D	N	D	N	D	N	D	N	D	N	D	N	
6400	26	6	9	7	11	4	7	..	..	..	..	..	..	..	..	..	..	44
6521	23	4	1	1	0	5	0	0	1	0	0	1	2	..	..	..	..	15
3578	28	10	2	19	0	7	7	3	5	5	1	5	2	0	2	5	2	75
7014	57	2	0	7	1	1	1	2	5	0	0	0	2	0	2	0	0	23
4992	63	1	5	1	9	0	3	0	1	0	7	0	10	0	4	0	2	43
7000	46	4	7	2	5	0	0	0	1	0	0	2	4	0	0	2	2	29
6716	17	9	0	10	0	11	2	8	1	6	1	2	4	2	6	5	3	70
6889	49	0	4	0	2	0	3	0	4	2	2	0	6	0	2	0	1	26
5434	22	8	2	3	4	7	2	8	1	9	1	7	1	3	2	4	70	70
7370	22	..	..	7	4	3	2	7	7	6	26	0	12	0	4	1	5	84
7505	20	..	..	..	..	..	..	7	25	12	32	1	23	9	13	1	16	139

Case 7370 was on trional from May 15th to Aug. 16th, 1896

Case 5434 was on trional from April 1st to May 19th, 1896.

Case 6521 was on trional from April 1st to Sept. 19th, 1896. Died Oct. 1st in *status epilepticus*.

Case No. 6400 died July 19th, 1896.

BROMIDE TREATMENT.—By the bromide treatment I mean those bromides used in preparing the Brown-Séguard Mixture, the formula of which is given as follows:

Potassii Bromidi
 Ammonii “
 Sodii “ aa. gr. 180
 Potassi Iodidi
 Ammonii “ aa. gr. 90
 Ammonii Carbonatis gr. 60
 Tr. Calumbæ $\frac{3}{4}$ iss
 Aquæ ad. $\frac{3}{4}$ viii

Fourteen men have received the above treatment. Seven came under treatment in April (1896) and seven in August. The average age of the fourteen patients is forty-five years, the oldest being seventy-nine and the youngest twenty. The average duration of the

disease is twenty years, the longest duration being fifty and the shortest one. Heredity has been admitted in six cases.

The causes of the disease:

- 1 lead poisoning,
- 1 masturbation,
- 1 atheroma,
- 1 fall on the head,
- 3 intemperance,
- 3 developed during infancy,
- 4 unknown.

The dose has been gradually increased until now (December 1) the average daily amount taken is *nine drachms*. The largest daily dose is *twelve drachms*; the smallest is *four drachms*. The convulsions have become less in number per month in *nine* cases. By referring to table No. 3 it will be seen that case No. 5787 has had only four seizures during the past eight months, and that case No. 4335 has had *none* during the same period of treatment. The last case mentioned takes the smallest daily dose of any patient being treated, the amount being *four drachms*. Seven patients out of the fourteen have gained in flesh; two have lost, and the remaining five show no essential physical change. Five of the patients do some kind of work, whereas they were idle before treatment began. The convulsions have become more severe in character in two cases; less severe in six, and there has been no appreciable change in character in the remaining six. Two have improved mentally, and five have suffered from slight bromism.

TABLE No. III.—BROMIDE TREATMENT—ALL MEN.

The table gives the number of diurnal and nocturnal seizures had in each month.

Case No.	Age.	April.		May.		June.		July.		Aug.		Sept.		Oct.		Nov.		Total
		D	N	D	N	D	N	D	N	D	N	D	N	D	N	D	N	
5787	57	0	0	0	0	2	0	1	0	1	0	0	0	0	0	0	0	4
4719	50	4	4	4	3	3	6	4	8	7	7	8	8	6	6	1	8	87
6961	26	1	1	1	0	0	0	0	0	0	2	2	3	0	1	1	2	14
4335	55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3970	79	0	0	1	1	0	0	0	3	0	0	1	1	0	1	0	0	8
3906	60	8	5	2	4	1	3	2	3	2	1	1	1	1	1	0	0	35
2849	50	5	12	4	4	4	6	3	8	1	5	0	5	2	2	1	5	67
7443	64	..	..	..	..	2	1	1	4	0	4	2	6	1	3	1	4	29
3181	41	..	..	..	..	..	..	..	..	1	4	0	5	1	3	1	4	19
7531	29	..	..	..	..	..	..	..	..	0	8	1	9	0	8	0	4	30
3738	30	..	..	..	..	..	..	..	..	11	0	8	1	6	2	4	3	35
6371	20	..	..	..	..	..	..	..	..	5	0	12	4	4	2	4	3	34
5933	40	..	..	..	..	..	..	..	..	0	2	0	5	1	1	6	1	16
4316	31	..	..	..	..	..	..	..	..	14	0	8	2	2	1	2	1	30

IRON HYDROCYANATE.—On the 1st of June (1896) six women and three men were put on iron hydrocyanate three times a day. In August three other cases were added, one woman and two men. The dose commenced with was one-half grain t.i.d., and it has been gradually increased until now all those who came under treatment in June are getting three grains t.i.d., and those who came under treatment in August are getting two grains t.i.d. The average age of the women is 32 years, the oldest being 38 and the youngest 27. The average duration of the disease in the women is 15 years, the longest duration being 30, and the shortest 3. The average age in the men is 33 years, the oldest being 53 and the youngest 14. The average duration of the disease in the men is 22 years, the longest duration being 41, and the shortest 14. Heredity is admitted in two cases, both men.

Causes of the disease in the women:

- 1 infantile paralysis,
- 1 childbirth,
- 1 fall on head in infancy,
- 1 pregnancy,
- 2 congenital,
- 1 fright.

Causes of the disease in the men:

- 1 infantile paralysis,
- 1 fall on the head,
- 3 unknown.

Results of the treatment in the women: Four have gained in flesh; three show no material physical change. Case No. 6224 has had six seizures since under the treatment, three in September and three in October. In the remaining six patients there has been no decided change in the number of convulsive attacks per month. The convulsions have become more severe in character in three cases; less severe in one, while there has been no appreciable change in the character of the seizures in three. The number of seizures has increased in number (per month) in two. Three patients will now do some kind of work, while formerly they were idle.

Results of treatment in the men: One has gained in weight, one has lost, while three have made no material change in physical condition. In case No. 7393, (a boy 14 years old, and an imbecile) there has been a very slight, yet gradual, decline in the number of convulsions per month.

The seizures have become more severe in character in one; less severe in two. The convulsions have increased in number per month in three. Those three (cases No. 5537, 5303 and 6061, see table No. 4) had the iron salt stopped on November 8th, as the results did not seem to warrant the further use of the drug. Case No. 7393 shows a tendency to change from day seizures to night seizures. See also case No. 6061.

All the patients under treatment have been given as much out-door exercise as has been possible. All have been employed, in some way, that could be induced to do anything. The diet, so far as has been deemed wise, has been limited to the vegetable class, with meat-soups, fish, white meats and sometimes a beef roast. Eggs have been used daily in the majority of cases. To prevent constipation, when there was such a tendency in any case, I gave

four minims of ichthyol t. i. d., which seemed to work admirably. In only one or two instances did the patient complain of the taste of the medicine. (Ichthyol.)

TABLE No. IV.—IRON HYDROCYANATE TREATMENT.

Convulsions had in each month, giving the diurnal and the nocturnal.

Case No.	Age.	April.		May.		June.		July.		Aug.		Sept.		Oct.		Nov.		Total
		D	N	D	N	D	N	D	N	D	N	D	N	D	N	D	N	
5668	F 38	1	6	1	14	1	10	2	9	1	3	0	5	0	6	1	6	66
6224	F 38	0	0	0	0	0	0	0	0	0	0	0	3	0	3	0	0	6
5939	F 30	0	3	1	0	2	3	3	1	1	2	0	5	0	6	1	1	29
4097	F 27	4	8	11	8	13	6	3	9	7	8	1	5	5	4	2	11	105
6424	F 28	8	6	6	9	8	3	5	7	9	6	0	8	5	10	6	6	102
4955	F 38	2	1	6	4	3	3	1	10	1	5	3	4	1	3	5	6	58
7306	F 30	..	..	..	..	..	..	8	6	9	1	8	5	9	0	4	5	55
6061	M 38	..	..	..	..	1	0	11	2	14	1	21	11	20	1	16	14	112
5800	M 32	..	..	..	..	0	1	8	1	3	8	11	5	6	13	5	6	67
5537	M 53	..	..	..	..	2	2	3	6	10	9	4	2	0	6	5	4	53
5303	M 27	..	..	..	..	3	3	6	5	9	5	5	1	12	3	7	7	66
7393	M 14	..	..	..	..	15	0	14	9	10	12	8	11	7	9	3	10	106

Iron salt was stopped in cases No. 5537, 5303 and 6061 in the early part of November.

From a study of the cases here presented it will be seen that the time has been entirely too short to form any decisive opinion concerning the value of any drug used in the treatment of this dread disease. Still we do not think that our efforts have been entirely futile. Of the forty-two cases given, seven have improved mentally; twenty-one have gained in flesh, and fourteen, who were formerly idle, do some kind of work. In twelve, the convulsive seizures have become less severe in character, while in twenty-three the number of seizures per month has been reduced.

SULFONAL AND TRIONAL IN EPILEPSY. WITH SOME REMARKS ON OTHER METHODS OF TREATMENT.

BY HENRY P. FROST, M. D.,
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“There is not a substance in the *materia medica*,—there is scarcely a substance in the world capable of passing through the gullet of man, that has not at one time or other enjoyed a reputation of being an anti-epileptic.” Thus Dr. Sieveking concluded his remarks on treatment in his treatise on epilepsy several decades ago, since which time a great variety of drugs then unknown have traversed the same route on a similar errand, and many of the older remedies have enjoyed for a season renewed popularity. And yet the treatment of epilepsy remains almost, if not quite, as unprofitable and discouraging a task now as it was then. Especially is this true of the class of cases which forms the basis of this report, namely, epileptic inmates of a hospital for the insane. These are, as a rule, cases of long standing and of more than average severity, either on account of the frequency of the seizures or the presence of unusual mental disturbance, rendering them, on the one hand, physically and mentally feeble or, on the other, dangerous; and in either case making necessary their commitment to the hospital, usually at a period of the disease when a cure is no longer a possibility, and frequently after the most approved treatment has been tried without benefit. Chronicity in these cases is a foregone conclusion and we enter upon their treatment solely with the hope of improving their general health, diminishing the number or the gravity of their attacks, and by discipline, exercise, employment and other “moral treatment,” rendering them less burdensome and troublesome members of the hospital community. To this end our treatment must continue to be directed, and the “newer therapy,” concerning which so much is being said and from which such brilliant results are expected, will secure a permanent place in asylum practice only on condition that

it accomplishes this result at least as satisfactorily as older methods. I shall limit myself to a statement of results obtained with several drugs which have been administered in this hospital to the class of cases already referred to, considering which it would be obviously unfair to subject these to comparison with cases similarly treated in general hospital or private practice.

Reports of experiments with phenacetin, antipyrin and acetanilid in epilepsy are found in recent medical literature. The conclusions reached are such as might have been anticipated, viz.: that these agents have no permanent, and in most cases not even a transient, beneficial effect upon the disease, and their continued administration in doses sufficient to produce their physiological effects is deleterious and often dangerous. Deterred by others' experience and our own inability to grasp the rationale of the administration of these drugs we have not used them at all, but we have treated some of our patients with sulfonal and others with trional, considering that we have, *a priori*, reason to expect therefrom effects at least equal to those obtained from other sedative and hypnotic drugs.

The following tables show the effect of these remedies upon the convulsions in a few cases in which accurate records were kept. Others not included in the tables for lack of perfectly reliable data presented practically similar features,—namely, a slight reduction in the frequency of the epileptic seizures,—which is all that the tables show—and comparative freedom from irritability and excitement.

TABLE No. I.
Average Number of Convulsions Daily.

Case No.	Without Treatment.	With Bromide.	With Sulfonal.
1	0.40	0.16	1.*
2	1.25	1.93	1.25
3	1.61	1.10	1.20
4	.63	.58	.33
5	.38	.29	.33
6	.58	No record	.20
7	1.27	1.04	.31
8	.80	.43	.50
9	.27	No record	.1
10	.27	No record	19

* Administered for ten days only.

TABLE No. II.

Average Number of Convulsions Daily.

Case No.	Without Treatment.	With Hamilton's Mixture.	With trional.
1	.18	.36	.13
2	.32	.45	.33
3	.20	.6	.00
4	.27	.1	.13
5	.29	No record	.23

The patients invariably felt comfortable under the influence of the medicine, and when a considerable number were under treatment at one time, assaults, altercations and disturbances of all kinds were notably infrequent in the epileptic wards. The dose has varied from five grains twice daily to ten grains three times a day, the object being to obtain no more than a fairly pronounced effect. The larger dose mentioned was only needed for a few days in any case, and after placing the patients in this way thoroughly under the influence of the drug, the size and frequency of the dose were diminished according to individual susceptibility. In only one case was it necessary to discontinue the treatment altogether on account of unfavorable symptoms. This was the man referred to as No. 1 in Table No. 1. He was not strong to begin with, and after a few days his heart was so seriously depressed, even by a very moderate dose of sulfonal, that it was not thought advisable to persist in its administration. Both drugs are well borne by the stomach and during their continuous use the appetite remains good. No marked effect upon the bodily nutrition was noticed in any of the cases. Some gained slightly in weight and vigor, others lost; but the change in either direction was probably independent of the medication. The urine was observed and at intervals tested for hæmatoporphyrin, but this indication of the toxic action of sulfonal did not make its appearance, owing, doubtless, to the caution exercised in its administration.

I think that these two drugs, and probably others of the same class, will prove useful in a considerable number of the epileptic cases which claim our attention in the State hospitals—not as specifics nor even as substitutes for the

bromides in the majority of cases, but rather as adjuncts to the bromides with which they can profitably be alternated; and, in particular, as safe, effective and pleasant sedatives for the epileptics who on account of their restlessness and obstreperous tendencies stand in need of such treatment. It is possible, of course, that their extended use may lead to a different conclusion, but so far as our observations have gone their action has appeared to be decidedly beneficial and a farther trial seems justified.

Our experience with thyroid extract in epilepsy is limited to two cases, both of which did so badly under the treatment that it had to be stopped at the end of ten days, and consequently an opportunity was not afforded us to judge its effect. Having previously administered thyroid to a number of patients with a view to its effect upon the mental condition, we were not unfamiliar with its action and were consequently careful to select robust subjects for experiment. Both were young and able-bodied, and free from organic or functional disease other than epilepsy, yet they were rendered seriously ill almost from the first by doses of five grains t. i. d. The heart became irregular and feeble in both cases and one, in addition, suffered with troublesome nausea and vomiting. In this connection it is proper to state that we now have under treatment a case (not an epileptic) in which the administration of thyroid in the same moderate doses for little more than a week has given rise to disturbance of the heart's action even more serious, which indeed very nearly proved fatal. The experience of others heretofore reported is not, on the whole, favorable to thyroid as a remedy in epilepsy, and its empirical use in this disease is not likely to become widespread.

Tincture of hyoscyamus has not given any good results in our experience. It was administered to a number of patients for definite periods during which their condition was compared with that noted during corresponding periods under other treatment. No diminution in the frequency or severity of the seizures was observed, and, in the mod-

erate doses which alone are suitable for continuous administration, its sedative action is very slight, rendering it practically valueless even from a purely utilitarian standpoint. I would not have it understood from my remarks on the value of sulfonal as a sedative, in addition to its direct controlling influence over the convulsive attacks, that the former action is in our opinion of paramount importance. On the contrary I think that we are all agreed that the essential treatment of epilepsy should be directed to the tendency underlying the motor and psychical explosions; and our endeavor should be to eradicate or weaken this tendency, not by paralyzing the nervous system with stupefying drugs but by improving its nutrition and thus inducing normal function. Nevertheless it is a fact of experience that certain cases, having reached an advanced stage of the disease and being beyond all hope of recovery or material improvement, may properly be subjected to any treatment which will render them more comfortable and less liable to accidents, and at the same time afford relief to those who are compelled to associate closely with them in ward, dormitory or dining-hall.

Returning to the treatment of epilepsy, properly so-called, certainly nothing has so far been found to take the place of the bromides, when intelligently prescribed. The administration of this one drug in the disease under consideration, is a subject which will repay the closest study, and the importance of treating each case individually can not be too strongly insisted upon. Some who are in no wise benefited by continuous medication are markedly improved by vigorous dosing at intervals. In one case the intervals can be regular and fixed—in another the indications of need for treatment must be awaited. Some patients do better on bromide alone, others derive benefit from other drugs in combination with it. Digitalis, belladonna and ergot, alone, have accomplished little in our experience, even in carefully selected cases, but given with bromide, all of these drugs have a definite place in the therapeutics of epilepsy.

Exercise and out-door employment are beneficial in a very high degree as we have occasion to observe every year during the summer months when these patients can be occupied at light labor on the grounds, but, as regards diet, I think too much has been taken for granted in the oft repeated statement that meats should be sparingly allowed, our experience being that no harm is done by the ordinary diet such as the other patients have, provided sedentary habits be avoided and due attention be paid to the digestive tract.

An exclusive milk diet without any medicine except laxatives was recently given to two patients for one month. Each of them had during that time a few more than the average number of convulsions noted during the preceding months—also without medical treatment—although both improved somewhat in physical condition. In another case (No. 3 in Table No. 1) the diet was composed entirely of milk and farinaceous foods for nearly a year, during which the daily average number of convulsions was 1.6 as against 1.8 the preceding year on the regular hospital dietary. These differences are very slight and moreover not constant, but as far as they go they offer no inducement for an extended trial of milk diet.

Reference has been made to the importance of paying attention to the digestive tract. No line of treatment holds out greater hope of success than intestinal antiseptics, on which I regret that my personal observations are not sufficient to be included in this paper. The value of treatment directed to the relief of gastric and intestinal derangements in many cases of epilepsy has long been recognized and the "newer therapy" can claim only the advance due to a better knowledge of the nature of auto-intoxication and the introduction of new antiseptic drugs suitable for internal use. G. E. Paget, in particular, (Lancet 1868) lectured upon what he termed "gastric epilepsy," and outlined a very satisfactory treatment for it.

In conclusion, if the results of treatment are mostly

negative, when summed up and analyzed, the patients are none the less benefited by a close attention to treatment—resulting in more accurate study of individual cases, improvement of their general bodily health and amelioration of their condition by means of the most suitable surroundings and employment.

A CASE OF PROCURSIVE EPILEPSY.

BY DANIEL H. ARTHUR, M. D.,

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It is only occasionally among the epileptic insane that conditions are met with that have not a familiar sound. Those mental symptoms of epilepsy which, in the majority of cases, are so active, preceding, in place of, or following convulsions, although differing in different patients, are generally the symptoms manifested with excitement or depression, unless dementia has progressed fast: such as homicidal or suicidal tendency; the disposition to resist everything, to quarrel with everyone, to want to fight, to hurt someone on the slightest provocation and on whom the kindest of treatment is ineffective. These are the familiar, every-day symptoms found in the epileptic insane and which are too common to make a history of interest.

There are, however, occasionally conditions met with which are uncommon and command interested attention. The report of the following case is of the latter character; and much more so in view of the trial for murder of Maria Barberi, where testimony was offered to prove that, during psychic epilepsy, the patient is never conscious of what he is doing:

T. E. M., admitted October 16th, 1896, age 29, single, native of the United States, farmer. Father insane from wound in head while serving in army. Weight, 141; heart and lungs, normal; temperature, 98 1-5; pulse, 72. First attack, duration one year; in fair physical condition. About three years ago, while cutting wood in the forest,

a small sapling, which was being bent by another person, slipped from his hands, striking patient in forehead, knocking him down. Patient was unconscious for about an hour. There was no fracture and not any extensive wound. No symptoms of compression or concussion ensued.

A few weeks later, patient stated, he commenced to have peculiar attacks when he was unable to speak. These attacks were ushered in with a stinging, throbbing pain between the eyes and through the temples. The patient stated that he had never fallen and did not think he had ever lost consciousness during attacks. He stated that his inability to speak was due to his not being able to think of any answer to the simplest question, and that as long as the pain continued in his head he was unable to control his actions, although conscious of what he was doing. These attacks came on daily and at first would last but about ten minutes. The length of time of the attacks and the conditions accompanying it began gradually to change. He became restless during the attack, and would walk fast, or even run in any direction in a blind manner, paying no attention to anyone or anything. Sometimes when on his way home from work he would be suddenly seized, when he would immediately turn about and start in any direction, keeping on until the attack ended, when he would return home.

About a month before his admission here, while driving a team drawing wood, through the streets of a village, he had an attack, when he left his team standing in the street and wandered away. When the attack ceased he found himself in an adjoining county many miles away, and also found that he had been gone two days. During this time he had travelled over a rough, mountainous country, in the middle of winter, a foot of snow on the ground. Patient states that at these times he can hear anything that may be said to him and can remember it afterwards, but can give no answer to the simplest question. He has a knowledge all the time of exactly what he is doing but can not control his actions. With his awakening, the headache disappears. He also states that the attack ceases as suddenly as it begins.

On admission he was found to be in good physical health, pupils dilated, face flushed and expressionless and appeared somewhat confused and dull. He stated that he did not use liquor but had chewed tobacco to excess, using as much as a pound in three days, and believed it was the cause of the severity of his attacks, but could not stop its use. His appearance was very similar to that of an epileptic dement, so familiar to hospital physicians. He, however, was able to describe his case very intelligently, and to give a good history of himself from the time of the accident to the present. On the day after admission he had one of these attacks which lasted about fifteen minutes. He was sitting in a chair on the hall when he suddenly jumped up and

started walking up and down as fast as he could go. A nurse attempted to stop him, but he resisted so strongly that he finally allowed him to go, following him and watching him closely. He continued this mad chase for fifteen minutes, when he ceased as suddenly as he started, appearing very much embarrassed. The following day he had another similar attack but it did not last as long. This time patient was restrained and placed in bed, the physician in charge being called. The patient appeared to be in a frenzy to get away and struggled violently. Pulse and respiration were rapid; pupils widely dilated; face flushed and an expression of fear. When he recovered he again stated that he had no control to stop resistance, and that the pain in his head was unbearable during the attack. He had attacks daily for a time, but they were of short duration and finally apparently ceased. For several weeks after admission the patient was very suspicious of other patients and attendants, and in consequence would stay by himself. During attacks patient stated that this suspicion of people became intensified to the extent of great fear. As the attacks became less frequent and less severe he became more sociable, and finally entered into all the entertainment of the house.

He was discharged February 6th, 1896, apparently free from any mental symptoms. It was learned that the attacks had recurred a few months later.

This patient had all the appearance of epilepsy and was undoubtedly affected with petit mal, or a psychic condition which takes the place of the convulsion. It is likely that he may have lost consciousness momentarily, but he certainly gave evidence of a knowledge of subsequent actions and an inability to control them.

COMPARATIVE REPORT

ON THE MALE AND FEMALE EPILEPTIC WARDS AT KINGS
COUNTY LUNATIC ASYLUM, KINGS PARK L. I.,
FROM FEBRUARY 1, 1894, TO JUNE 1, 1895.

BY D. M. TRICE, M. D.,
Assistant Physician, Long Island State Hospital, Kings Park, L. I.

I would state that the statistics comprised herein were gained in the following manner: First, the number of seizures was taken from the ward reports for one month,

viz., from August 15 to September 15, 1894. During this time there were thirty-eight epileptics on each respective ward. The number of prescriptions was obtained by going over our druggist's file for six months, and over the night reports of the respective wards. The number of deaths was obtained by going over our official records. My reason for choosing the dates for the deaths April 1, 1894, to June 1, 1895, was that April 1, 1894, was two months after the "Anti-Epileptic" treatment was commenced on the male ward, and June 1st was three months after it had been discontinued.

From February 1, 1894, to March 1, 1895, the male epileptics received the "Anti-Epileptic" treatment, consisting of grs. 105 of the bromides of potassium, sodium and lithium, and gtt. xv of fld. ext. of hyoscyamus, daily. During the same space of time the female epileptics received no medical treatment for epilepsy, save in the case of one patient. Said patient is a case of "traumatic epilepsy," and when her seizures come on, unless they are aborted by treatment, she is liable to pass into the "status epilepticus." During the above mentioned space of time she had three attacks. On two of these occasions she received *per rectum* chloral hydrate in sol. dr. i; and as soon as she regained consciousness she received *per orem* bromide of sodium in sol. drs. ii; on the other occasion she received *per rectum* chloral hydrate dr. i; and *per orem* bromide of sodium dr. i. The number of seizures for the aforesaid month was; females, 595; males, 545; so far showing a slight advantage in favor of the so-called "Anti-Epileptic" treatment. The number of prescriptions given during six months on the respective wards was, males, 553; females, 26. Said prescriptions include the above mentioned "Anti-Epileptic" mixture, which was administered in equal doses t. i. d. The deaths from April 1, 1894, to June 1, 1895, were, males, 9; females, 4; of the latter three were undoubtedly epileptics. The fourth was under my observation and care for seven months. During this time she never had an epileptic attack. At

the end of this time, being phthisical she was transferred to the phthisical cottage, where she remained a little over two months, and finally died of phthisis pulmonalis. A short time before her death she had one or two convulsions, and was consequently classed as an epileptic.

The above mentioned patients were of the same class, and, save for medicinal treatment, under identically similar conditions as regards food, surroundings, care, etc.

Basing my conclusions upon the foregoing statistics and former observations, I maintain: First, that by the constant administration of bromides in large quantities, the number of epileptic attacks can be slightly diminished. I also maintain, however, that bromides administered in sufficient quantities, and for a long enough period to accomplish such results, must necessarily undermine the general constitution of the person to whom administered, and that the death rate taken for a year, in any given number of cases, will be far heavier in the cases where such amounts of bromides are administered, than in those where none has been given. My colleague on the male service has recently commenced a different treatment with his epileptic cases, viz., for three weeks he gave them sodium borate grs. viii t. i. d. At the end of this time he changed them to the three above mentioned bromides grs. x; chloral hydrate, grs. v; and Fowler's sol. arsenic, gtt. ii t. i. d. So far he reports a marked decrease in the number of attacks.

I shall be pleased to report again at the end of six months.

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January, 1896.

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A QUARTERLY REPORT OF CLINICAL AND PATHOLOGICAL WORK
IN THE STATE HOSPITALS (FOR THE INSANE), AND
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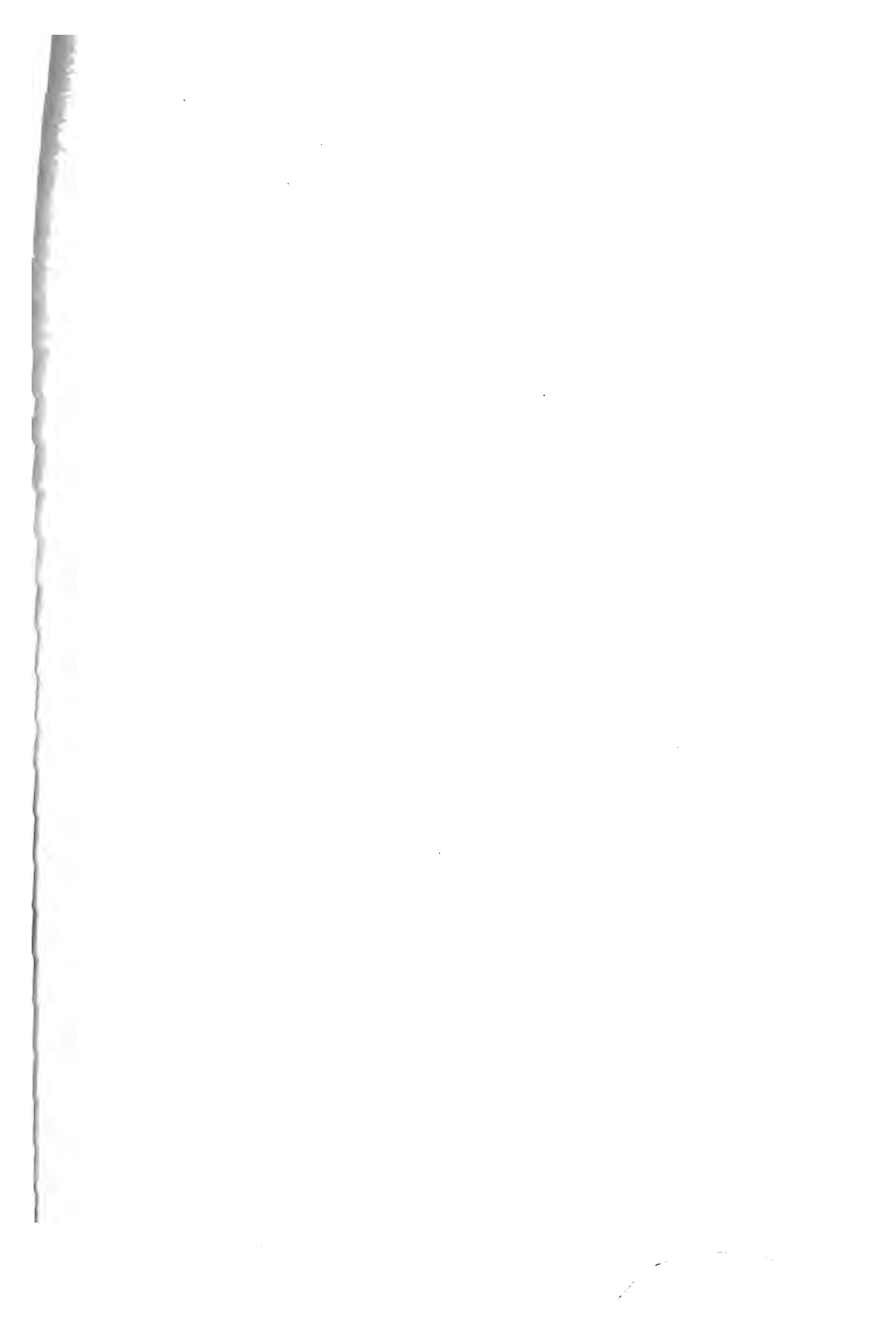
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